

# PROCEEDINGS

OF THE

# Biological Society of Washington

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1955

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### PUBLICATION NOTE

By a change in the By-Laws of the Biological Society of Washington, effective March 27, 1926, the fiscal year now begins in May, and the officers will henceforth hold office from May to May. This, however, will make no change in the volumes of the Proceedings, which will continue to coincide with the calendar year. In order to furnish desired information, the title page of the current volume and the list of newly elected officers and committees will hereafter be published soon after the annual election in May.

All correspondence should be addressed to the Biological Society of Washington, % U. S. National Museum, Washington, D. C.

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**BIOLOGICAL SOCIETY OF WASHINGTON**  
(FOR 1955-1956)

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(ELECTED MAY 19, 1955)

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## TABLE OF CONTENTS

---

|                                                                                                                                        |         |
|----------------------------------------------------------------------------------------------------------------------------------------|---------|
| Officers and Committees for 1955.....                                                                                                  | iii     |
| Proceedings for 1955.....                                                                                                              |         |
| Three New Pikas ( <i>Genus Ochotona</i> ) from Utah, by Stephen<br>D. Durrant and M. Raymond Lee.....                                  | 1-10    |
| Descriptions of New Colubrid Snakes, Genus <i>Atractus</i> ,<br>from Ecuador, by Jay M. Savage.....                                    | 11-20   |
| New Records and Descriptions of Polydesmoid Millipeds<br>(Order Polydesmida) from the Eastern United States,<br>by Nell B. Causey..... | 21-30   |
| Studies on Spiroboloid Millipeds. II. A Second Paper<br>on the Genus <i>Eurhinocricus</i> , by Richard L. Hoffman.....                 | 31-36   |
| A New Subspecies of <i>Blarina brevicauda</i> from Florida,<br>by W. J. Hamilton, Jr.....                                              | 37-40   |
| Variation in the White-throated Fantail Flycatcher,<br><i>Rhipidura albicollis</i> , by S. Dillon Ripley.....                          | 41-46   |
| Five New Venezeulan Birds and Nine Extensions of Ranges<br>to Colombia, by William H. Phelps and William H.<br>Phelps, Jr.....         | 47-58   |
| <i>Thrips Illicii</i> , A Proposed Emendation (Thysanoptera;<br>Thripidae), by J. Douglas Hood.....                                    | 59-60   |
| A New Species of <i>Cinara</i> from Oregon (Aphidae) by F. C.<br>Hottes and E. O. Essig.....                                           | 61-64   |
| A New Species of <i>Cinara</i> from Arizona (Aphidae) by F. C.<br>Hottes and George D. Butler, Jr.....                                 | 65-66   |
| <i>Cinara</i> Descriptions (Aphidae), by F. C. Hottes.....                                                                             | 67-78   |
| A New Pocket Gopher from South-Central Utah, by<br>Stephen D. Durrant.....                                                             | 79-82   |
| Two New Rice Rats (Genus <i>Oryzomys</i> ) from Florida, by<br>W. J. Hamilton, Jr.....                                                 | 83-86   |
| New Records and Descriptions of California Diplopoda,<br>by Nell B. Causey.....                                                        | 87-94   |
| A New Crayfish of the Genus <i>Cambarus</i> from Mississippi,<br>by Horton H. Hobbs, Jr.....                                           | 95-100  |
| Three New Subspecies and Figures of Five Previously<br>Unfigured Species of <i>Cinara</i> (Aphidae). by F. C.<br>Hottes.....           | 101-104 |
| Some Tingidae from the French Cameroons (Hemiptera),<br>by Carl J. Drake.....                                                          | 105-108 |
| Two New Species of Shore-bugs (Hemiptera) (Saldidae:<br>Leptopodidae), by Carl J. Drake.....                                           | 109-112 |

(ii) *Proceedings of the Biological Society of Washington*

|                                                                                                                            |         |
|----------------------------------------------------------------------------------------------------------------------------|---------|
| Seven New Birds from Cerro de la Neblina, Territorio Amazonas, Venezuela, by William H. Phelps and William H. Phelps, Jr.  | 113-124 |
| A New Tropicuchid from Japan (Homoptera: Fulgoroidea), by R. G. Fennah                                                     | 125-128 |
| The Family Clausiidae (Copepoda, Cyclopoida), by Mildred Stratton Wilson and Paul L. Illg                                  | 129-142 |
| A Remarkable New Species of Perilitus from Mexico (Hymenoptera: Braconidae), by C. F. W. Muesebeck                         | 143-144 |
| Four New Races of Birds from East Asia, by H. G. Deignan                                                                   | 145-148 |
| The Wisconsin Puma, by Hartley H. T. Jackson                                                                               | 149-150 |
| Studies on Spiroboloid Millipeds. III. The Genus <i>Spirobolinus</i> Silvestri, by Richard L. Hoffman                      | 151-154 |
| The Type Locality of <i>Hyla triseriata</i> Wied, by Francis Harper                                                        | 155-156 |
| The Diamondback Terrapins ( <i>Malaclemys terrapin</i> ) of Peninsula Florida, by Albert Schwartz                          | 157-164 |
| A New Species of Bat (Genus <i>Myotis</i> ) from Coahuila, Mexico, by Rollin H. Baker                                      | 165-166 |
| Three New Rodents of the Genera <i>Micromys</i> and <i>Apodemus</i> from Korea, by David H. Johnson and J. Knox Jones, Jr. | 167-174 |
| A New Chipmunk from Korea, by David H. Johnson and J. Knox Jones, Jr.                                                      | 175-176 |
| A New Species of Free-tailed Bat (Genus <i>Eumops</i> ) from Brazil, by Charles L. Handley, Jr.                            | 177-178 |
| Four New American Chilopods, by Ralph V. Chamberlin                                                                        | 179-182 |
| Two New Jerboas from Egypt, by Henry W. Setzer                                                                             | 183-184 |
| Status of the Generic Name <i>Zorilla</i> (Mammalia): Nomenclature by Rule or by Caprice, by Philip Hershkovitz            | 185-192 |
| A New Reed Vole, Genus <i>Microtus</i> , from Central Korea, by J. Knox Jones, Jr., and David H. Johnson                   | 193-196 |
| Three New Species of <i>Cinara</i> (Aphidae), by F. C. Hottes                                                              | 197-204 |

## LIST OF PLATES

|                                         |     |
|-----------------------------------------|-----|
| 1. Map of Ecuador.....                  | 12  |
| 2. Polydesmoid Millipeds.....           | 26  |
| 3. New Species of <i>Cinara</i> .....   | 68  |
| 4. New Species of <i>Cinara</i> .....   | 70  |
| 5. New Species of <i>Cinara</i> .....   | 72  |
| 6. New Species of <i>Cinara</i> .....   | 74  |
| 7. Californian Diplopoda.....           | 94  |
| 8. <i>Cambarus cristatus</i> .....      | 100 |
| 9. Species of <i>Cinara</i> .....       | 103 |
| 10. Species of <i>Cinara</i> .....      | 104 |
| 11. <i>Trichoduchus japonicus</i> ..... | 127 |
| 12. <i>Spirobolinus</i> details.....    | 153 |
| 13. <i>Myotis planiceps</i> .....       | 166 |
| 14. New Species of <i>Cinara</i> .....  | 200 |

**PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON**

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**PROCEEDINGS**

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The Society has held two meetings during the year, both in Room 43 of the U. S. National Museum.

**May 19, 1955—1019th Meeting  
SEVENTY SIXTH ANNUAL MEETING**

President Deignan in the chair; 23 persons present.

The reports of the Recording Secretary and Treasurer were presented, and informal reports were made by the Corresponding Secretary and the Editor.

The following officials and members of Council were elected:

President, Hugh T. O'Neill; Vice Presidents, Alan Stone, Herbert Friedmann, Howard B. Owens, D. H. Johnson; Recording Secretary, S. F. Blake; Corresponding Secretary, Gorman M. Bond; Treasurer, Allen J. Duvall; Members of Council, Louise M. Russell, Charles O. Handley, Jr., Maurice K. Brady, Albert C. Smith, Viola S. Schantz.

The business meeting was followed by a paper: H. G. Deignan, Adventures in Thailand.

**December 6, 1955—1020th Meeting**

Joint meeting with Entomological Society of Washington.

*Formal communication:* W. F. Knipling, Eradication of screw-worm by introduction of gammaradiated males into the field.



PROCEEDINGS  
OF THE  
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THREE NEW PIKAS (*GENUS OCHOTONA*)  
FROM UTAH

BY STEPHEN D. DURRANT AND M. RAYMOND LEE

In his Mammals of Utah, Durrant (Univ. Kansas Publs., Mus. Nat. Hist., 6:67-73, August 10, 1952) recognized 5 subspecies of *Ochotona princeps* (Richardson) as occurring in Utah. While Durrant's manuscript was in press, Gardner (Journ. Washington Acad. Sci., 40:344, October 15, 1950) named *Ochotona princeps moorei* from the Wasatch Plateau. Durrant (*op. cit.*:70) previously studied two of the specimens upon which Gardner based the name *Ochotona princeps moorei* and although he recognized differences, owing to the paucity of specimens, he referred them to *O. p. cinnamomea*. Recent acquisitions of additional specimens from critical areas and also from areas from which these animals had not been previously recorded, indicate the existence in Utah of three heretofore undescribed subspecies of the aforementioned species. Moreover, our studies confirm that the animals from the Wasatch Plateau belong to *O. p. moorei* and not to *O. p. cinnamomea* as indicated by Durrant. Of the 5 subspecies mentioned by Durrant (*op. cit.*:67-73), only 4 are now known to occur in Utah, because no animals from Utah are now known to be referable to *O. p. saxatilis*. The addition of the three new kinds herein described and named indicate that the pikas from Utah now belong to eight subspecies.

For the loan of comparative material we are indebted to the following: Seth B. Benson, Museum of Vertebrate Zoology, University of California, Berkeley, California; Viola S. Schantz and John W. Aldrich, U. S. National Museum, Washington, D. C.; Albert C. Rogers, and Alfred M. Bailey, Denver Museum of Natural History, Denver, Colorado; Vasco M. Tanner and C. Lynn Hayward, Department of Zoology, Brigham Young University, Provo, Utah. Unless otherwise indicated all measurements are in millimeters. Capitalized color terms are after Ridgway (Color Standards and Color Nomenclature, Washington, D. C., 1912). Part of this study was made under a research grant by the National Science Foundation.

***Ochotona princeps wasatchensis*, new subspecies**

*Type*.—Male, adult, skin and skull, number 4787, Museum of Zoology, University of Utah; 10 miles above lower powerhouse, road to Cardiff Mine, Big Cottonwood Canyon, Salt Lake County, Utah; June 24, 1946; collected by J. Berryman; original number 1.

*Range*.—Southern Wasatch Mountains, limits unknown.

*Diagnosis*.—*Color: Summer pelage*: Sides and upper parts near Light Ochraceous Buff (some specimens approach Warm Buff), back darker than sides owing to moderate suffusion of dark hairs; top of head between Cinnamon Buff and Clay Color; underparts Light Buff to Warm Buff; upper surface of fore and hind feet between Light Buff and Warm Buff; subauricular and postauricular regions Light Ochraceous Buff surrounded by Cinnamon-Buff; inner and outer surfaces of ears black; margins of ears whitish. *Winter pelage*: Darker than summer; sides and upper parts near Pinkish Buff moderately suffused with brown; subauricular and postauricular regions particularly less distinctive; top of head notably darker. *Skull*: Rostrum short; nasals short with straight lateral margins; orbit small; maxillary fenestrae small and subcircular; proximal ends of nasals rounded; anterior margin of palatal bridge concave; zygomata parallel; palatal bridge narrow.

*Comparisons*.—In color, topotypes of *O. p. wasatchensis* differs from both topotypes of *O. p. clamosa* and near topotypes of *O. p. uinta* as follows: Lighter; subauricular and postauricular regions markedly lighter, general appearance buffy as opposed to pinkish cinnamon; sides and upper parts near Light Ochraceous-Buff with comparatively little suffusion of dark hairs, as opposed to near Light Pinkish Cinnamon or approaching Pinkish Buff with a predominance of dark hairs; top of head with less suffusion of dark hairs; upper surfaces of fore and hind feet with more buff.

From topotypes of *Ochotona princeps clamosa*, topotypes of *O. p. wasatchensis* differ as follows: *Size*: Smaller; ears longer. *Skull*: Posterior ends of nasals wider; zygomata parallel as opposed to divergent posteriorly; coronal suture square as opposed to rounded; maxillary fenestrae average smaller and relatively wider (dorso-ventrally); palatal bridge wider (antero-posteriorly); posterior margin of palatal bridge evenly rounded as opposed to V-shaped; width of molariform teeth less; antero-ventral processes of zygomata projecting less laterad; tympanic bullae markedly less inflated ventrally; interptergoid space narrower; infraorbital foramen oval as opposed to elongate dorso-ventrally.

Comparisons of topotypes of *O. p. wasatchensis* with near topotypes of *Ochotona princeps uinta* show the former to possess the following differences: *Size*: Smaller; ear and hind foot longer. *Skull*: Smaller in most measurements; rostrum shorter, but relatively wider; nasals shorter, lateral margins straight as opposed to slightly concave; orbit markedly smaller; zygomatic breadth less; posterior ends of nasals round as opposed to wedge-shaped; posterior outline of skull in dorsal view, rounded as opposed to wedge-shaped; maxillary fenestrae markedly smaller and of different shape, being shorter but actually as well as relatively wider (dorso-ventrally); zygomata weaker; masseteric fossa of the zygoma shorter and narrower; palatine vacuities larger; anterior margin of palatal bridge markedly concave as opposed to nearly straight;



palatal bridge markedly wider (antero-posteriorly); alveolar length of upper molariform teeth shorter; basioccipital narrower and shorter; width across exoccipital processes less; tympanic bullae shorter (antero-posteriorly) but more inflated ventrally.

Characters that distinguish topotypes of *O. p. wasatchensis* from near topotypes of *Ochotona princeps moorei* are as follows: Ear and hind foot longer. *Color*: Darker; general appearance buffy as opposed to buffy gray; upper parts near Light Ochraceous-Buff as opposed to Pale Ochraceous-Buff. *Skull*: Lateral margins of nasals straight and not expanded anteriorly as opposed to concave and expanded anteriorly; posterior ends of nasals round as opposed to moderately wedge-shaped; in dorsal view, outline of lower margin of maxillary fenestrae concave as opposed to straight or slightly convex; posterior ends of nasals extend relatively further caudad; lateral margins of zygomatics approximately straight as opposed to slightly convex; width of zygomatic at union of zygomatic process of squamosal and jugal less; maxillary fenestrae shorter but relatively wider (dorso-ventrally); palatine vacuities larger and "teardrop" shaped as opposed to nearly oval; posterior end of palatine vacuities relatively wider; posterior margin of palatal bridge concave as opposed to straight or slightly convex; interpterygoid space narrower; tympanic bullae smaller.

For comparisons of topotypes of *O. p. wasatchensis* with animals from the Fishlake Plateau and with those from the La Sal Mountains, see accounts under the new subspecies herein described from these localities.

Topotypes of *O. p. wasatchensis* differ from near topotypes of *Ochotona princeps utahensis* as follows: *Size*: Markedly smaller; ear longer. *Color*: Lighter throughout (general appearance buffy as opposed to grayish). *Skull*: Smaller; lateral margins of nasals straight as opposed to concave; anterior ends of nasals not inflated as opposed to inflated; rostrum shorter; maxillary fenestrae markedly smaller; orbit longer; palatine vacuities larger; anterior margin of palatal bridge concave as opposed to nearly straight (some specimens have a median caudal process); interpterygoid space shorter; basioccipital shorter.

Topotypes of *O. p. wasatchensis* can be easily distinguished from those of *Ochotona princeps fuscipes* and *Ochotona princeps cinnamomea* as follows: *Size*: Larger than *O. p. cinnamomea*. *Color*: Lighter; general appearance buffy as opposed to pinkish or cinnamon; head buffy as opposed to grayish. *Skull*: Larger; nasals markedly longer; orbit longer; palatal bridge markedly wider (antero-posteriorly); alveolar length of upper molariform teeth greater; interpterygoid space narrower.

Topotypes of *O. p. wasatchensis* can be distinguished from those of *O. p. figginsii* as follows: *Size*: Larger. *Color*: Upper parts lighter; sides and upper parts buffy as opposed to cinnamon; underparts lighter. *Skull*: Occipitonasal length greater; lateral margins of nasals straight as opposed to slightly concave; orbit wider; maxillary fenestrae markedly smaller; basioccipital shorter.

Comparisons of topotypes of *O. p. wasatchensis* with topotypes of *Ochotona princeps saxatilis* show the former to differ as follows: *Color*: Lighter, upper parts Light Ochraceous-Buff as opposed to Light Buff; dorsum lighter owing to less suffusion of dark hairs; under parts more buffy. *Skull*: Occipitonasal length less; lateral margins of nasals straight

as opposed to concave; posterior half of nasals markedly wider; orbit longer; maxillary fenestrae shorter but relatively wider; posterior processes of zygomata shorter and narrower; anterior margin of palatal bridge more concave; breadth of braincase less; basioccipital markedly narrower; tympanic bullae larger.

*Specimens examined*.—Total, 27, distributed as follows: *Salt Lake County*: Silver Lake Post Office (Brighton), 9,000 feet, 3; Silver Lake, Big Cottonwood Canyon, 8,700 feet, 1; near Lake Solitude, Silver Lake Post Office (Brighton), 9,000 feet, 1; 10 miles above lower powerhouse, road to Cardiff Mine, Big Cottonwood Canyon, 1; Big Cottonwood Canyon, 1½ miles down canyon from "The Spruces", 1; 2 miles above Alta, 6; Mountain Lake, near Alta, 10,000 feet, 1; Little Cottonwood Canyon, 6 miles above Wasatch Boulevard, 1; Big Willow Canyon, 7,000 feet, 1. *Utah County*: Mt. Timpanogos, 11 (B.Y.U.).

***Ochotona princeps lasalensis*, new subspecies**

*Type*.—Male, adult, skin and skull, number 6409, Museum of Zoology, University of Utah; Warner Ranger Station, 9,750 feet, La Sal Mountains, Grand County, Utah; June 23, 1948; collected by Keith R. Kelson; original number 531.

*Range*.—La Sal Mountains of Eastern Utah.

*Diagnosis*.—*Color*: *Winter pelage* (worn): Sides and upperparts Pinkish Buff, dorsum darker because of greater admixture of brown hairs; underparts Pale Pinkish-Buff; general appearance of animals buffy gray as a result of exposure of under fur; upper surfaces of fore and hind feet between Pale Pinkish Buff and Pinkish Buff; subauricular region near Light Ochraceous-Buff; inner surface of ears approaching Mummy Brown, with light scattering of buffy hairs; margins of ears whitish with longer hairs on anterior margins pale buffy; top of head grayish to pale buffy, with moderate mixture of brownish hairs. *Skull*: Rostrum wide; nasals long and narrow posteriorly; antero-lateral margin of zygomatic arch angular and concave; orbit wide; posterior margin of orbital plate of maxillary containing alveoli of last two upper cheek teeth, bilobed; masseteric fossae of zygomata long, and wide posteriorly; anterior margin of palatal bridge straight; alveolar length of upper molariform teeth markedly long; width of molars markedly wide.

*Comparisons*.—*Ochotona princeps lasalensis* can be distinguished from all subspecies studied as follows: *Skull*: Antero-lateral margins of zygomata angular and slightly concave as opposed to evenly rounded and convex; posterior margin of orbital plate of maxillary containing alveoli of last two upper cheek teeth, highly elevated and bilobed as opposed to having only one distinct lobe; alveolar length of upper molariform teeth greater; posterior ends of nasals narrower.

With the exception of animals referable to *O. p. vinta* and *O. p. utahensis*, those of *O. p. lasalensis* differ from all others studied in having longer nasals. Furthermore, with the exception of specimens of *O. p. clamosa*, *O. p. fuscipes* and *O. p. cinnamomea*, those referable to *O. p. lasalensis* differ from all others studied in having a markedly wider posterior region of the masseteric fossa.

The nearest subspecies geographically and morphologically to *O. p. lasalensis* is *Ochotona princeps saxatilis*. Topotypes of *O. p. lasalensis*

can be distinguished from those of *O. p. saxatilis* as follows: Ears shorter. *Color*: Sides and upper parts Pinkish Buff as opposed to near Light Buff (one specimen Ivory Yellow); upper parts darker with greater admixture of brown; subauricular region near Light Ochraceous-Buff, as opposed to Warm Buff; inner surfaces of ears darker; region between nose and vibrissae grayish as opposed to yellowish or buffy. *Skull*: Rostrum wider; orbit markedly wider; zygomatic breadth greater; anterior margin of palatal bridge straight as opposed to slightly concave; basioccipital narrower; tympanic bullae more inflated ventrally; width of molariform teeth markedly greater; dorsal margin of foramen magnum more deeply concave.

Topotypes of *O. p. lasalensis* can be distinguished from those of *Ochotona princeps figginsi* as follows: *Color*: Lighter, sides and upper parts Pinkish Buff as opposed to between Cinnamon-Buff and Cinnamon; dorsum lighter with less admixture of dark brown; subauricular region near Light Ochraceous-Buff as opposed to near Clay Color; head grayish buffy as opposed to brownish cinnamon; underparts lighter. *Skull*: Rostrum wider; premaxillae extend further caudad; posterior margin of parietals and interparietal rounded as opposed to pointed or square; orbit wider; anterior margin of palatal bridge straight as opposed to concave; ventral tips of exoccipital processes wider; palatal bridge wider; width of cheek teeth greater.

Comparison of topotypes of *O. p. lasalensis* with specimens of *Ochotona princeps winta* show the following: *Size*: Smaller. *Color*: Lighter; sides and upper parts near Pinkish Buff as opposed to Light Pinkish Cinnamon, underparts lighter; head less brownish. *Skull*: Orbit shorter; coronal suture square as opposed to rounded; maxillary fenestrae slightly smaller; palatal bridge wider (antero-posteriorly).

Topotypes of *O. p. lasalensis* differ from those of *Ochotona princeps wasatchensis* as follows: *Color*: More uniformly buffy grayish; sides and upperparts near Pinkish Buff as opposed to Light Ochraceous-Buff; head markedly grayer. *Skull*: Zygomatic breadth greater; rostrum longer; frontal processes of premaxillae extend further caudad; maxillary fenestrae larger; zygomata heavier; anterior margin of palatal bridge straight as opposed to concave; palatal bridge markedly wider; tympanic bullae larger.

The following characters distinguish topotypes of *O. p. lasalensis* from those of *Ochotona princeps clamosa*: *Size*: Slightly smaller, ear longer. *Color*: Differs in color from *O. p. clamosa* as it does from *O. p. winta*. *Skull*: Rostrum markedly longer; maxillary fenestrae markedly larger; anterior margin of palatal bridge straight as opposed to concave; palatal bridge markedly wider (antero-posteriorly); median ventral ridge of basioccipital less pronounced.

Topotypes of *O. p. lasalensis* can be distinguished from those of *Ochotona princeps moorei* as follows: *Color*: General appearance buffy as opposed to grayish buffy; sides and upper parts Pinkish Buff as opposed to Pale Ochraceous-Buff. *Skull*: Rostrum longer; lateral margins of nasals straight as opposed to concave; maxillary fenestrae larger; masseteric fossa of zygoma longer and shallower; anterior margin of palatal bridge straight as opposed to concave; palatine vacuities larger; sphenopalatine vacuities shorter; tympanic bullae shorter.

Comparison of topotypes of *O. p. lasalensis* with near topotypes of *Ochotona princeps utahensis* show the following: *Size*: Smaller. *Color*: Lighter, buffy as opposed to grayish. *Skull*: Masseteric fossa of zygomatic arch shallower; zygomatic arch heavier; palatal bridge wider (antero-posteriorly); sphenopalatine vacuities longer.

Topotypes of *O. p. lasalensis* differ from those of *Ochotona princeps cinnamomea* and near topotypes of *O. p. fuscipes* as follows: *Size*: Larger. *Color*: Lighter; general appearance buffy as opposed to cinnamon or pinkish cinnamon; head buffy as opposed to grayish. *Skull*: Larger in nearly all measurements taken; rostrum longer; palatal bridge markedly wider (antero-posteriorly); width of basioccipital greater; tympanic bullae larger.

Comparison of *O. p. lasalensis* with animals from the Fishlake Plateau are given under the account of the new subspecies named from there. *Specimens examined*.—Total, 14, distributed as follows: *Grand County*: ½ mile, N Warner R. S., La Sal Mountains, 9,000 feet, 1; Warner R. S., 9,750 feet, La Sal Mountains, 5 (1, B.Y.U.); ½ mile S Warner R. S., La Sal Mountains, 9,700 feet, 1. *San Juan County*: Mt. Mellithin, La Sal Mountains, 12,280 feet, 2 (B.Y.U.); Geyser Pass, La Sal Mountains, 5 (B.Y.U.).

#### *Ochotona princeps barnesi*, new subspecies

*Type*.—Male, adult, skin and skull, number 8140, Museum of Zoology, University of Utah; Johnson's Reservoir, 8,800 feet, 15 miles north of Loa (Fishlake Plateau), Sevier County, Utah; August 23, 1952; collected by M. Raymond Lee; original number, 123.

*Range*.—Fishlake Plateau and environs.

*Diagnosis*.—*Size*: Large (see measurements). *Color*: *Summer pelage*: Dark; sides and back near Pinkish Buff with moderate suffusion of dark brown; top of head Pinkish Buff with moderate suffusion of Sepia; ears dark brown, margins whitish; subauricular patch large, center Pinkish Buff surrounded by near Cinnamon; upper surface of fore and hind feet near Pinkish Buff; underparts Pinkish Buff to Clay Color, darkest in pectoral region. *Winter pelage*: Grayer throughout. *Skull*: Large; nasals markedly inflated anteriorly; rostrum deep with concave dorsal surface; upper incisors long and procumbent; palatine vacuities large and in approximately one-half of the specimens examined, asymmetrical (right-half larger than left); interpterygoid space narrow; basioccipital long and wide; braincase deep.

*Comparisons*.—Both cranial and external measurements show animals belonging to *Ochotona princeps barnesi* to be the largest of any of the pikas studied.

Topotypes of *O. p. barnesi* differ from near topotypes of *O. p. utahensis* as follows: *Size*: Total length greater; ears longer. *Color*: Sides and upper parts slightly lighter (some specimens indistinguishable); top of head lighter (moderately washed with Sepia as opposed to heavily washed with Sepia); underparts lighter, particularly pectoral region (between Cinnamon-Buff and Clay Color as opposed to near Sayal Brown). *Skull*: Averages larger in nearly all measurements taken; nasals markedly inflated anteriorly as opposed to slightly inflated; in dorsal outline rostrum slightly concave as opposed to convex; incisors



longer, wider and more procumbent; sphenopalatine vacuities longer; palatal bridge wider; rostrum deeper; depth of braincase over bullae greater; interpterygoid space narrower. Differences in the following features were found to be statistically significant between the two aforementioned subspecies: Total length, length of ear, basilar length, length of incisors, length of basioccipital, depth of braincase, depth of rostrum.

From specimens of *Ochotona princeps moorei* topotypes *O. p. barnesi* differs as follows: *Size*: Larger. *Color*: Darker; upper parts near Pinkish Buff as opposed to Pale Ochraceous-Buff; suffusion of brown on sides and upper parts greater. *Skull*: Markedly larger in nearly all measurements; nasals longer and markedly inflated anteriorly as opposed to shorter with anterior ends expanded laterally; rostrum longer; incisors markedly longer; maxillary fenestrae markedly larger; palatine vacuities larger; posterior border of palatal bridge concave as opposed to straight; tympanic bullae larger.

The following characters distinguish topotypes of *O. p. barnesi* from those of *O. p. cinnamomea* and *O. p. fuscipes*: *Size*: Larger. *Color*: Head brownish as opposed to grayish; sides and upper parts Pinkish Buff as opposed to Cinnamon or Pinkish Cinnamon. *Skull*: Markedly larger in nearly all measurements; nasals longer and inflated anteriorly; maxillary fenestrae markedly larger; orbit larger; palatal bridge wider; interpterygoid space relatively narrower; upper incisors longer and more procumbent; tympanic bullae larger and more inflated ventally.

Comparisons of topotypes of *O. p. barnesi* with specimens of *O. p. uinta* show the former to be much more closely related to *O. p. uinta* than to either *O. p. cinnamomea* or *O. p. fuscipes*. Characters of significance show topotypes of *O. p. barnesi* to differ from *O. p. uinta* from several localities in the Uinta Mountains as follows: *Size*: Slightly larger. *Color*: General appearance grayer; side and upper parts buffy as opposed to cinnamon buffy. *Skull*: Nasals longer and more inflated anteriorly; interorbital width greater; maxillary fenestrae slightly larger; palatal bridge markedly narrower (antero-posteriorly); palatine vacuities longer; tympanic bullae larger, being markedly longer.

Topotypes of *O. p. barnesi* differ from those of *O. p. figginsi* as follows: *Size*: Larger. *Color*: Sides and upper parts buffy moderately suffused with brown as opposed to cinnamon buffy heavily washed with dark brown. *Skull*: Slightly larger; nasals more inflated anteriorly; alveolar length of maxillary teeth greater; anterior margin of palatal bridge straight as opposed to markedly concave; occipito-sphenoidal suture straight as opposed to V-shaped.

Comparisons of topotypes of *O. p. saxatilis* with those of *O. p. barnesi* show the latter to differ as follows: *Size*: Larger. *Color*: Darker (general appearance browner); sides and upper parts Pinkish Buff moderately suffused with brown as opposed to Light Buff lightly suffused with brown. *Skull*: Larger in most measurements; posterior ends of nasals wider; maxillary fenestrae larger; posterior part of skull from lateral view slopes less sharply ventrad; anterior margin of palatal bridge square as opposed to concave; basioccipital wider; tympanic bullae larger and more inflated; rostrum deeper dorso-ventrally.

From topotypes of *O. p. lasalensis* those of *O. p. barnesi* can be distinguished as follows: *Size*: Larger. *Color*: Slightly darker; sides and

upper parts with more suffusion of brown; subauricular region more cinnamon. *Skull*: Larger in most measurements; nasals more inflated anteriorly; posterior ends of nasals wider; orbit longer; upper incisors longer; maxillary fenestrae larger; palatal bridge narrower; basioccipital markedly wider and longer.

Comparisons of topotypes of *O. p. barnesi* with topotypes of *O. p. wasatchensis* show the former to differ as follows: *Size*: Larger. *Color*: Darker (suffusion of brown greater); sides and upper parts pinkish buff as opposed to light ochraceous-buff. *Skull*: Larger in nearly all measurements; nasals markedly more inflated anteriorly as opposed to relatively straight; frontal tongues of premaxillae longer; incisors more procumbent; maxillary fenestrae longer; upper disastema longer; anterior margin of palatal bridge straight as opposed to concave; basioccipital wider.

Topotypes of *O. p. barnesi* differ from topotypes of *O. p. clamosa* as follows: *Size*: Larger. *Color*: Differs from *O. p. clamosa* in much the same way that it does from *O. p. uinta*. *Skull*: Larger in nearly all measurements; nasals longer and markedly more inflated anteriorly; incisors longer; orbits longer; maxillary fenestrae markedly longer; tympanic bullae relatively less inflated ventrally; interpterygoid space markedly longer; palatal bridge wider (antero-posteriorly).

The name *Ochotona princeps barnesi* is in recognition of Claude T. Barnes, dean of Utah mammalogists whose writings first focused attention upon the mammalian fauna of Utah.

*Specimens examined*.—Total, 23, distributed as follows: *Sevier County*: 1 mi. NW Mt. Marvine (Seven Mile Valley), 9,200 ft., 6; Seven Mile Canyon 4 mi N Johnson's Res., 8,800 ft., 2; Johnson's Res., 8,800 ft., 15

As a result of this study, the pikas of Utah are now arranged in eight subspecies of *Ochotona princeps*. In Utah, these animals are restricted to talus slopes in high mountains. Our studies have led us to conclude that in addition to talus another important ecological requirement is moisture. We have never obtained animals from dry talus. This causes for a lack of occurrence of pikas in all talus slopes in any given mountain range. The majority of the mountains of Utah are isolated from each other by intervening valleys. These two ecological factors of talus and moisture in addition to the isolation of the mountains have caused for complete isolation of these animals.

In spite of this complete isolation of the populations of pikas, the evidence as presented by color and cranial details have enabled us to recognize complexes of relationship of the several subspecies. *Ochotona princeps saxatilis*, a Coloradan subspecies has its closest affinities with *O. p. lasaleensis* from the La Sal Mountains of Utah, and not with *O. p. figginsii* of the western mountains of Colorado. *Ochotona princeps figginsii*, *O. p. uinta*, from the Uinta Mountains, *O. p. barnesi* from the Fishlake Mountains, and *O. p. utahensis* from the Aquarius Plateau constitute another complex of related subspecies. The Wasatch Mountains are inhabited by another complex consisting of *O. p. clamosa* from the northern area and *O. p. wasatchensis* from the southern area. The latter two subspecies are from the same ancestral stock, and are distinct from the subspecies which occur in the eastern plateaus of Utah.

This closer relationship of the pikas from the high plateaus of eastern Utah with those from the Rocky Mountains of Colorado than with those from the Wasatch Mountains is in agreement with that known to exist in other species of mammals.

The animals of *O. p. moorei* from the Wasatch Plateau in central Utah merit special consideration. While being distinct in color they do resemble *O. p. wasatchensis*. Cranially, they are distinct but do show some relationship with *O. p. barnesi* of the eastern complex. Past physiography indicates that there was opportunity for pikas from both the Wasatch Mountains and the eastern plateaus to attain the Wasatch Plateau. Animals now referable to *O. p. moorei* probably originated from an intergrading population of ancestral types of both complexes which became subsequently isolated. This is more than mere conjecture because it is known that intergradation between other kinds of mammals occurs at present on the Wasatch Plateau. Red squirrels, *Tamiasciurus hudsonicus fremonti* from Colorado and eastern Utah, and those of *T. h. ventorum* of the Wasatch Mountains intergrade on the Wasatch Plateau. Likewise, golden-mantled ground squirrels (*Citellus lateralis*) show this same phenomenon. Members of these two latter genera are not so restricted ecologically as are pikas which may account for the latter evolving into a distinct subspecies on the Wasatch Plateau while the squirrels still form intergrading populations there.

Pikas of the subspecies *O. p. cinnamomea* from the Beaver Mountains and those of *O. p. fuscipes* from Iron Mountain form another complex and are related to the subspecies *O. p. tutelata* from central Nevada. Both Howell (N. Amer. Fauna, 47, p. 46, August 21, 1924) and Hall (Mammals of Nevada, p. 59, Univ. California Press, July 1, 1946) remarked upon the relationship between *O. p. cinnamomea* and animals from central Nevada now known as *O. p. tutelata*. Geographically, the range of *O. p. fuscipes* is adjacent to that of *O. p. cinnamomea*, and although they are in the same complex, the former is more unlike the latter than the latter is from animals from central Nevada. Animals of *O. p. fuscipes* show some characters of the pikas from eastern Utah. This would suggest some gene exchange in the not too distant past between animals from the eastern complex and those that came into Utah from the west.

Geologists mostly agree that the mountains of Utah, where these subspecies of pikas occur are relatively young. The great uplifts that formed the major mountains and plateaus of Utah are no older than late Pliocene. Moreover, many of the uplifts are considered to have originated during the Pleistocene, and some even in the Late Pleistocene. In view of the youth of these mountains, the degree and amount of morphological differentiation between animals of the several subspecies of pikas indicate that subspeciation has been relatively rapid in this animal. These rapid uplifts would cause an increase in talus and followed by the aridity of the Late Pleistocene would effectively form isolated populations of pikas on the several mountains. Sufficient time has elapsed for them to have become subspecifically distinct.

Contribution from Department of Zoology, University of Utah, Salt Lake City, Utah.

TABLE I  
MEASUREMENTS OF OCHOTONA

| Total length                                           | Length of hind foot | Length of ear | Occlusal length | Basilar length | Zygomatic breadth | Length of nasals | Length of orbit | Length of basicapital | Width of palatal bridge | Length of maxillary fenestrae | Alveolar length maxillary tooth-row |
|--------------------------------------------------------|---------------------|---------------|-----------------|----------------|-------------------|------------------|-----------------|-----------------------|-------------------------|-------------------------------|-------------------------------------|
| <i>O. p. wasatchensis</i> 4 ♂ ♂ type, 3 near topotypes |                     |               |                 |                |                   |                  |                 |                       |                         |                               |                                     |
| Average                                                | 188.8               | 32.0          | 23.3            | 42.9           | 20.9              | 14.7             | 10.0            | 8.4                   | 2.0                     | 4.8                           | 8.6                                 |
| Minimum                                                | 181                 | 31            | 23              | 42.2           | 20.3              | 13.9             | 9.6             | 8.4                   | 1.9                     | 4.4                           | 8.4                                 |
| Maximum                                                | 197                 | 33            | 25              | 43.7           | 21.5              | 15.1             | 10.5            | 8.4                   | 2.0                     | 5.1                           | 8.8                                 |
| <i>O. p. lasatensis</i> 3 ♂ ♂ type, 2 topotypes        |                     |               |                 |                |                   |                  |                 |                       |                         |                               |                                     |
| Average                                                | 178.7               | 31.0          | 23.0            | 44.4           | 22.6              | 15.3             | 10.0            | 8.5                   | 2.5                     | 5.6                           | 9.1                                 |
| Minimum                                                | 178                 | 30            | 22              | 43.5           | 22.5              | 15.1             | 9.7             | 8.5                   | 2.2                     | 5.3                           | 8.9                                 |
| Maximum                                                | 180                 | 32            | 24              | 45.4           | 22.7              | 15.5             | 10.2            | 8.5                   | 2.8                     | 5.8                           | 9.4                                 |
| <i>O. p. barnesi</i> 3 ♂ ♂ type, 2 topotypes           |                     |               |                 |                |                   |                  |                 |                       |                         |                               |                                     |
| Average                                                | 210.7               | 32.5          | 25              | 46.9           | 22.7              | 15.8             | 10.7            | 9.5                   | 2.2                     | 6.1                           | 9.0                                 |
| Minimum                                                | 210                 | 32            | 24              | 46.6           | 22.0              | 15.5             | 10.2            | 9.3                   | 2.2                     | 6.0                           | 8.5                                 |
| Maximum                                                | 212                 | 33            | 25              | 47.5           | 23.2              | 16.1             | 11.1            | 9.8                   | 2.2                     | 6.1                           | 9.4                                 |
| <i>O. p. wasatchensis</i> 8 ♀ ♀ near topotypes         |                     |               |                 |                |                   |                  |                 |                       |                         |                               |                                     |
| Average                                                | 187.6               | 31.5          | 25.1            | 43.9           | 21.0              | 14.9             | 10.2            | 8.5                   | 2.1                     | 4.8                           | 8.6                                 |
| Minimum                                                | 180                 | 30            | 23              | 42.0           | 20.3              | 14.1             | 9.7             | 8.1                   | 1.7                     | 4.2                           | 8.4                                 |
| Maximum                                                | 198                 | 34            | 26              | 45.5           | 21.6              | 15.9             | 10.5            | 9.1                   | 2.5                     | 5.1                           | 8.9                                 |
| <i>O. p. lasatensis</i> 3 ♀ ♀ topotypes                |                     |               |                 |                |                   |                  |                 |                       |                         |                               |                                     |
| Average                                                | 190.3               | 30            | 23              | 43.2           | 21.9              | 15.0             | 9.9             | 8.4                   | 2.5                     | 5.2                           | 9.0                                 |
| Minimum                                                | 182                 | 30            | 22              | 42.5           | 21.5              | 14.6             | 9.6             | 8.0                   | 2.2                     | 5.0                           | 9.0                                 |
| Maximum                                                | 200                 | 30            | 24              | 44.5           | 22.2              | 15.3             | 10.1            | 8.8                   | 2.9                     | 5.6                           | 9.1                                 |
| <i>O. p. barnesi</i> 6 ♀ ♀ topotypes                   |                     |               |                 |                |                   |                  |                 |                       |                         |                               |                                     |
| Average                                                | 202.5               | 30.0          | 22.5            | 44.3           | 21.6              | 14.7             | 10.1            | 8.8                   | 2.2                     | 5.9                           | 8.7                                 |
| Minimum                                                | 200                 | 28            | 20              | 43.6           | 20.9              | 14.1             | 9.7             | 8.3                   | 2.0                     | 5.5                           | 8.5                                 |
| Maximum                                                | 205                 | 32            | 24              | 45.1           | 22.1              | 15.3             | 10.3            | 9.1                   | 2.3                     | 6.2                           | 9.1                                 |







PROCEEDINGS  
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DESCRIPTIONS OF NEW COLUBRID SNAKES,  
GENUS *ATRACTUS*, FROM ECUADOR

BY JAY M. SAVAGE

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During the past few years I have been engaged in a revisional study of the Ecuadorian snakes of the genus *Atractus* Wagler, 1828. This analysis, based on an examination of approximately 350 examples about 250 of which were from Ecuador, is now near completion but as publication may be delayed it seems advisable to present preliminary diagnoses of the new forms. Acknowledgments for aid and material and a detailed discussion of the species and their affinities are reserved for the larger work.

The five species described in this paper belong to the *trilineatus* group of the genus. The group is characterized by non-capitate hemipenes, long loreal, small rostral, small internasals and large prefrontals. Forms having either 15 or 17 rows of dorsal scales occur in this section of *Atractus* but it seems likely that the forms with 15 scale rows have been derived from species with 17 rows. The color pattern of *trilineatus* and its allies is primitively of dark longitudinal stripes on a lighter ground color but many populations exhibit a tendency toward melanism and the color of these forms is of nearly uniform dark brown, gray or black. The species group has a wide range in South America and at least 25 names have been applied to members of the stock. Only two of these names appear to be applicable to Ecuadorian striped *Atractus*.

Since all the new forms described here are representatives of the *trilineatus* complex certain of them may eventually prove to be subspecifically allied either to one another or to extra-limital forms. Available information, especially regarding non-Ecuadorian *Atractus*, does not permit adequate exploration of this possibility and it seems best under the circumstances to regard each distinct population as a separate species.

Since the snakes described below are the only striped members of the *trilineatus* group besides *Atractus duboisi* Boulenger, 1880 and *Atractus collaris* Peracca, 1897, known from Ecuador, a provisional key for the identification of Ecuadorian members of this section is presented at the end of the paper.

Throughout this report where more than one specimen is at hand counts and measurements are given as follows: 1-2-3 (2.5). In this style of notation the figure in parentheses is from the holotype, the first figure indicates the lower limit of the variational range in the paratypes, the second number the arithmetic mean of the paratypic series and the

third figure the upper limit of the range of variation in the paratypes.

Abbreviations represent the following collections: American Museum of Natural History (AM); British Museum of Natural History (BM); Chicago Natural History Museum (CM); Escuela Politecnica Nacional, Ecuador (EP); Museum National d'Histoire Naturelle, Paris (PM); Museum of Zoology, University of Michigan (UM); Natural History Museum, Stanford University (SU).

*Atractus gaigeae*, new species

*Rhabdosoma maculatum* Bocourt, 1883 (part), p. 540, pl. 35 fig. 1.

*Atractus bocourti* Boulenger, 1894 (part), p. 306.

*Holotype*: UM 82887, a male from Santiago-Zamora Province, Ecua-

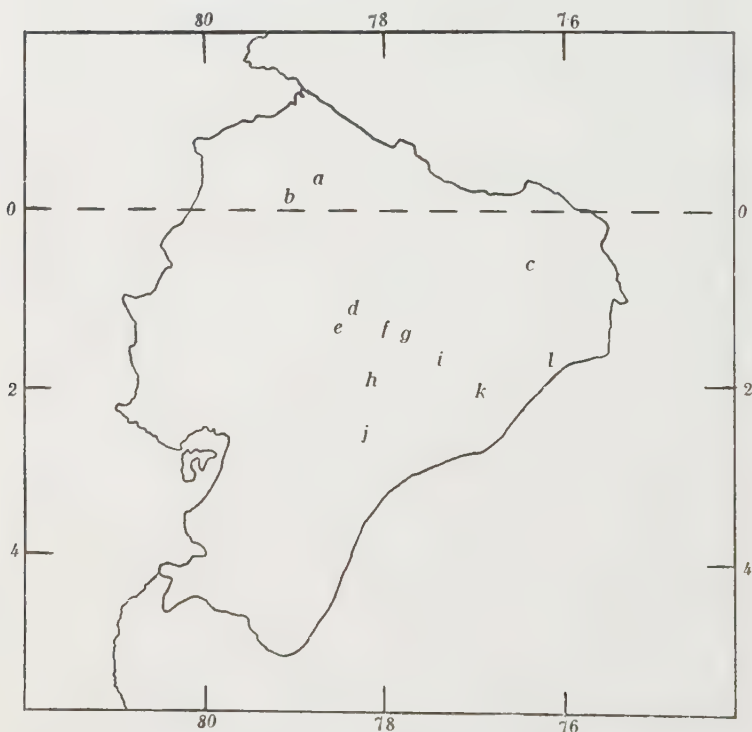


Fig. 1. Map of Ecuador showing position of localities mentioned in text. a. Intac, b. Mindó, c. Loreto, d. Llanganate, e. Baños, f. headwaters of Río Bobonaza, g. Canelos, h. Paitanga, i. Sarayacu, j. Sucua, k. Chicerota, l. Río Cononaco.

dor. Collected in the summer of 1935 by Clarence Altenberg and Bancroft G. Butler.

*Paratypes*: Also available are six paratypes from Napo-Pastaza Prov-



ince, Ecuador: between Baños and Canelos (AM 35891, a male); headwaters of the Río Bobonaza (SU 15621, a male); Canelos (SU 15619, a female and SU 15620, a male); Sarayacu (EP 48, a male); Chicherota (EP 46, a female).

*Diagnosis*: A form most closely resembling *A. collaris* Peracca, 1897, of Peru and Ecuador and the Ecuadorian forms *A. ecuadorensis*, *A. occidentalis* and *A. dunni* described in this paper, but distinguished from these forms and other members of the genus in Ecuador by: 1) dorsal scales in 17 rows; 2) loreal between two and three times as long as postnasal; 3) teeth on maxillary 5-6; 4) ventrals in males 189-191-198 (192), in females 207-210-213; 5) pattern of seven dark stripes and two rows of regularly arranged dark spots.

*Lepidosis*: Rostral smaller than a prefrontal, pentagonal. Internasals much less than half as large as prefrontals; a little broader than long. Prefrontals longer than broad. Postoculars two. Temporals 1+2. Supralabials seven, third and fourth in eye. Infralabials six, usually three (rarely four) meeting a chin shield on each side. Caudals in males 35-37-39 (37), in females 25-26-27. Ventrals plus caudals 222-228.5-240 (236).

*Hemipenes*: Organ bifurcate at tip, covered with spines for complete length; largest spines in region of sulcus division, decreasing in size distally and proximally. Several small basal plicae mounted with minute hooked spines. A well-developed lateral fold or pocket extending from plicate area to level of fourth or fifth caudal, naked. This pocket lies opposite the sulcus spermaticus. Sulcus divided at seventh caudal. Hemipenes reaching to level of 11th or 12th caudal.

*Coloration*: Dorsal ground color brown and imposed upon it are seven dark longitudinal lines or stripes: a vertebral stripe, a single scale row wide; a pair of lateral stripes on the lower half of third and upper half of second scale rows; a pair of ventral stripes on upper edges of ventrals and lower half of first scale row; and between the ventral and lateral stripes on each side, restricted to the upper margin of the first and lower edge of second scale rows, an irregular lateroventral stripe. Between the vertebral and lateral stripes are a series of regularly arranged obscure dark dorsolateral blotches. A dark brown area on neck continuous with lateral brown stripes, bordering the posterior edge of the light nuchal collar. The collar is formed by the light throat color which extends upward on the neck as two narrow arms involving the tips of the parietals but not meeting on the mid-line. Top of head dark except for light spots on anterior part of prefrontals, internasals and in temporal region. Other head scales mainly brown but lower portions of rostral, nasals, loreals and supralabials frequently light. Throat and chin light with some brown markings on mental, chin shields and infralabials. Belly immaculate, light (salmon in freshly preserved material). Underside of tail and anal plate light, the former area with a few median brown spots.

*Measurements in millimeters*: Standard length (snout to anus) in males 197-225.5-251 (225), in females 280-296-312; tail length in males 23.5-28.6-34 (32), in females 22-24-26; head length (snout to tip of parietals) 6-6.4-7 (7.5); head width 3.5-4-4.5 (4).

*Remarks*: This species was originally described by Bocourt (1883,

p. 540) as part of his *Rhabdosoma maculatum*. His name was based on a female example in the Paris Museum with 144 ventrals, 20 caudals and the lateral stripes more or less broken into spots. Also included within *Rhabdosoma maculatum* by Bocourt was a specimen in the Berlin Museum, a male with 191 ventrals, 29 caudals and the pattern as described above for *gaigeae*. Both of Bocourt's specimens were from "Ecuador."

Boulenger (1894, p. 306, 308) placed *maculatum* in the genus *Atractus* making the name a secondary homonym of Günther's (1858, p. 204) *Isocelis maculata* of Brasil (also an *Atractus*). To further complicate matters Boulenger concluded that Bocourt's female specimen was an example of the eastern South American species *A. badius* and included the male snake from the Berlin Museum in his new species *Atractus bocourti* (type locality, Acomayo, Departament Huanuco, Peru). Neither of these allocations can be accepted on the basis of coloration, longitudinal counts and the hemipenes. Bocourt's first specimen (now PM 5986), which is herewith designated the lectotype of his *Rhabdosoma maculatum*, is a distinctive form completely unrelated to *A. badius*. The Berlin Museum snake is unquestionably identical with *A. gaigeae*.

On the basis of data kindly supplied by Mr. J. C. Battersby of the British Museum of Natural History, two males in the collections of that institution appear referable to *A. gaigeae*. One example (BM 80.12.12.8.13) from Canelos, Napo-Pastaza Province, Ecuador, has 190 ventrals and 36 caudals. The second specimen is from Paitanga, probably in eastern Chimborazo Province, Ecuador, and has 189 ventrals and 35 caudals. In other characters both specimens agree with the description presented above for *A. gaigeae*.

Within the *trilineatus* group *A. gaigeae* most closely resembles *A. collaris* Peracca, 1897 (type locality, Rio Cononaco, Napo-Pastaza Province, Ecuador) in coloration but *collaris* lacks a vertebral stripe and has fewer ventrals, 163 in the male holotype and 175 in a female (SU 12482) from Pevas, Loreto Territory, Peru. The other forms most like *gaigeae* in color pattern differ in the number of longitudinal stripes and series of dorsolateral blotches as well as in having fewer ventrals.

The new species is named in honor of Mrs. Helen Thompson Gaige, long associated with the Museum of Zoology, University of Michigan, who was interested in Ecuadorian members of the genus *Atractus* and surrendered her prior claim so that I might prepare a revisional study.

#### *Atractus dunni*, new species

*Rhabdosoma maculatum* Bocourt, 1883, p. 539, pl. 34, fig. 2 (type locality, Ecuador), a secondary homonym of *Atractus maculatus* (Günther, 1858).

*Holotype*: PM 5986, a female.

*Diagnosis*: A species closely related to *A. gaigeae* but distinguished from that form and other Ecuadorian *Atractus* as follows: 1) dorsal scales in 17 rows; 2) loreal between two and three times as long as postnasal; 3) maxillary teeth not known but probably less than 9 in number; 4) ventrals in female lectotype 144, probably about 10 less in males; 5) pattern of five longitudinal stripes and two series of spots.

*Lepidosis*: Rostral smaller than a prefrontal. Internasals much less

than half as large as a prefrontal. Prefrontals longer than broad. Postoculars two. Temporals 1+2. Supralabials seven, third and fourth in eye. Infralabials five, three meeting a chin shield on each side. Caudals 20. Ventrals plus caudals 164.

*Coloration:* Dorsal ground color brown with a vertebral dark stripe, two lateral dark stripes, a pair of ventral stripes and a series of dorso-lateral dark blotches on each side. Lateral stripes partially broken into discrete spots. A light nuchal collar which does not completely incircle neck, bordered posteriorly by a dark area which is continuous with the lateral stripes. Head mainly brown. Throat, belly, anal plate and underside of tail light.

*Measurements in millimeters:* Standard length 305; tail length 34.

*Remarks:* This is a new name for *Rhabdosoma maculatum* Bocourt, 1883, which is preoccupied in *Atractus* by *Isocelis maculata* Günther, 1858. The above description is derived from Bocourt's original account and plate and information kindly provided by M. Jean Guibé of the Paris Museum.

The species is named for Dr. Emmett Reid Dunn of Haverford College at whose suggestion a review of Ecuadorian *Atractus* was undertaken.

#### *Atractus ecuadorensis*, new species

*Holotype:* CM 23529, a male from "Llangate area," Ecuador (probably refers to the Llanganate Range of eastern Tungurahua Province). Collected in March of 1936 by R. W. Chadwick.

*Diagnosis:* A form similar to *A. dunni* and *A. occidentalis* but differing from them both in coloration and ventral counts. Distinct from all Ecuadorian *Atractus* in: 1) dorsal scales in 17 rows; 2) loreal between two and three times as long as a postnasal; 3) maxillary teeth 8; 4) ventrals in male holotype 144, should be about 10 higher in females; 5) pattern composed of six longitudinal stripes which may be more or less interrupted.

*Lepidos:* Rostral smaller than a prefrontal. Internasals much less than half as large as prefrontals. Prefrontals longer than broad. Postoculars two. Temporals 1+2. Supralabials seven, third and fourth in eye. Infralabials five, three meeting each chin shield. Caudals 41. Ventrals plus caudals 185.

*Hemipenes:* The tail of the type is in poor condition and an accurate description of the penial structures is not possible. The organ appears to be essentially similar to that of *A. gaigeae* and extends to the level of the 12th caudal.

*Coloration:* Ground color a light brown upon which are superimposed a pair of dorsolateral dark stripes (homologous to the dorsolateral blotches in *A. gaigeae* and *A. dunni*) on the fifth and sixth or sixth and seventh scale rows; a pair of lateral stripes on the third and fourth scale rows; and a third stripe on each side (lateroventral), most prominent anteriorly, running along the margins of the first and second scale rows. All these stripes except the last frequently interrupted and discontinuous. No vertebral or ventral stripes. Dark postnuchal collar connects the dorsolateral and lateral stripes. Nuchal collar light, reduced, hardly involving tips of parietals. Head dark brown except for light areas on supralabials. Throat and chin light, mental, chin shields and

infralabials heavily mottled with brown. Belly and underside of tail light, with a sprinkling of brown marks which are most concentrated posteriorly.

*Measurements in millimeters:* Standard length 198; tail length 48; head length 8; head width 4.

*Remarks:* This form is quite similar to *A. occidentalis* its cognate from western Ecuador. The two forms are unique among the 17 scale rowed Ecuadorian members of the *trilineatus* group in lacking ventral stripes. In addition to differences in ventrals, maxillary dentition and hemipenial features *A. ecuadorensis* is distinct from *A. occidentalis* in lacking a vertebral dark stripe.

*Ecuadorensis* resembles to a lesser extent *A. dunni*. The two agree closely, when due allowance is made for the sex of the types, in scutellation but the coloration is very different and it is doubtful that the two forms will prove to be identical.

#### ***Atractus occidentalis*, new species**

*Holotype:* BM 1916.5.23.5, a male from Mindo, Pichincha Province, Ecuador, collected by W. Goodfellow.

*Diagnosis:* A form showing closest similarity in coloration to *A. ecuadorensis* and in scutellation to *A. dunni* but differing from them and other *Atractus* from Ecuador in: 1) dorsal scales in 17 rows; 2) loreal between two and three times as long as postnasal; 3) maxillary teeth 6; 4) ventrals in male holotype 153; 5) pattern of six irregular longitudinal stripes.

*Lepidosis:* Rostral smaller than a prefrontal, roughly pentagonal. Internasals much less than half as large as prefrontals; about as broad as long. Prefrontals longer than broad. Postoculars 2-3. Temporals 1+2. Supralabials seven, third and fourth in eye. Infralabials six, four contacting chin shields on each side. Caudals 39. Ventrals plus caudals 192.

*Hemipenes:* Bifurcate, covered with large spines medially and with very small spines at tip and base. Basal plicae with small hooked spines. Lateral fold or pocket reaching level of fourth caudal, naked. This pocket opposite the sulcus spermaticus which divides at seventh caudal. Hemipenes reaching 18th caudal.

*Coloration:* Dorsal ground color brown with six irregular longitudinal stripes of darker brown disposed upon it as follows: a pair of lateral stripes on portions of third and fourth or fourth and fifth scale rows; a pair of lateroventral stripes on parts of first and second scale rows; and a dorsolateral pair of stripes corresponding to the dorsolateral blotches of *A. gageae* on the sixth and seventh scale rows. No definite ventral stripes although dark markings at tips of ventrals. The light collar on neck not sharply demarcated posteriorly by a dark area, suffused with brown pigment, the two lateral arms narrowly separated by darker brown medially and involving posterior-lateral portion of parietals. Top of head dark brown, sides lighter except for dark line through eye along upper edges of supralabials. Lower half of supralabials light; throat and chin light with brown spots on anterior infralabials, chin shields and mental. Belly light anteriorly, clouded with dark brown markings most concentrated laterally. At level of about 110th ventral



the clouding comes to overlie most of the venter. Anal brown. Undersides of tail dark brown with a few light punctations.

*Measurements in millimeters:* Standard length 265; tail length 56; length of head 9; width of head 5.

*Remarks:* *A. occidentalis* appears to be the west Ecuador representative of *A. ecuadorensis* which it resembles in coloration. The new form is well distinguished from *ecuadorensis* by the number of maxillary teeth, ventrals and the hemipenes.

The name *occidentalis* is from Latin meaning western and seems appropriate for an *Atractus* from the west slope of the Ecuadorian Andes.

#### *Atractus orcesi*, new species

*Holotype:* SU 15622, a male from Loreto, Napo-Pastaza Province, Ecuador. Collected in October of 1952 by J. Olalla.

*Diagnosis:* A species obviously allied to *A. duboisi* Boulenger, 1880, but also showing some affinity with east Ecuadorian 17 scale rowed forms. Well distinguished within the genus in: 1) dorsal scales in 15 rows; 2) loreal between two and three times as long as postnasal; 3) teeth on maxillary 7; 4) ventrals in male type 153, probably about 10 higher in females; 5) pattern of five longitudinal stripes on back and a broad mid-ventral dark stripe.

*Lepidosis:* Rostral smaller than a prefrontal, almost triangular. Internasals much less than half as large as prefrontal; a little broader than long. Prefrontals longer than broad. Postoculars two. Temporals 1+2. Supralabials seven, third and fourth in eye. Infralabials six, three meeting a chin shield on each side. Caudals 32. Ventrals plus caudals 185.

*Hemipenes:* Bifurcate at tip, covered with moderate spines of almost uniform size. Basal plicae small, surmounted by spines which gradually blend into spines on body of organ. Lateral fold or naked pocket opposite sulcus spermaticus, extending to fifth caudal. Sulcus divided at seventh caudal. Hemipenes reaching to level of 12th caudal.

*Coloration:* Dorsal ground color brown with a series of dark longitudinal stripes: a single irregular mid-dorsal stripe, a pair of lateral stripes on upper half of second and lower portion of third scale rows and a pair of ventral stripes on tips of ventrals and lower edges of first scale row. A broad light color on neck, demarcated by light and dark brown areas posteriorly. One dark area continuous with lateral stripes. Light collar complete, not divided by brown mid-dorsally, occupying most of parietals. Upper and lateral head shields dark brown with a few scattered light flecks, except for lower two-thirds of supralabials which are light. A more or less prominent postocular stripe from postoculars to last supralabial. Chin and throat light except for some brownish areas. Belly light with a broad median dark stripe running the length of the body and two ventral stripes along edges of ventrals. On some ventral scutes brown mottling connects the mid-ventral stripe with the ventral stripes along edges of the ventral plates. Anal plate dark brown with light posterior margin. Underside of tail almost uniform brown with a few light flecks.

*Measurements in millimeters:* Standard length 269; tail length 38.5; head length 8; head width 4.



*Remarks:* This form is very close to *A. duboisi* Boulenger, 1880, originally described from the Andes of Ecuador on the basis of a male with 150 ventrals and 32 caudals. A second specimen of *duboisi* (EP 611) from Sucua, Santiago-Zamora Province, Ecuador, is a female with 157 ventrals and 18 caudals. The specimen from Intac, Imbabura Province, Ecuador, on the western slopes of the Andes referred by Boulenger (1894, p. 310) to *duboisi* is a young female with 172 ventrals and 16 caudals and obviously cannot be allocated with either *duboisi* or *orcesi* both east Ecuadorian forms. The Intac specimen probably represents an undescribed species of the *trilineatus* group.

*A. orcesi* appears to be the lowland cognate of *A. duboisi* of the east Andian slopes. The two forms are distinguished by differences in ventral counts, number of maxillary teeth, number of infralabials in contact with the chin shields and number of supralabials. In addition *A. orcesi* retains a vertebral dark stripe and a pair of lateral stripes which are lacking in *duboisi*. The dark mid-ventral stripe is also broader in *orcesi* than in the montane form. Although most of these differences are trivial and subject to some variation in other *Atractus* populations and while few examples are available, it still seems worthwhile to distinguish between the two forms. The distributional pattern with *orcesi* in the lowlands and *duboisi* at higher altitudes further justifies the concept of two distinct forms.

In the type of hemipenes *orcesi* is similar to *A. occipitoalbus* Jan, 1862, a uniformly black, 15 scale rowed form from eastern Ecuador. It is quite possible that these forms are related but *occipitoalbus* has a lower ventral count and is a slimmer snake than *orcesi* or *dubosi*. *A. occipitoalbus* and *A. orcesi* occur together at the type locality of the latter species. Superficially *A. ecuadorensis*, a 17 scale rowed species, resembles *A. orcesi* and *A. duboisi* and it may be that the 15 scale rowed forms are derived from *ecuadorensis* or some other of the striped, species having 17 scale rows. The relationship does not appear to be particularly close between *orcesi* and any other *Atractus* except *duboisi*.

This species is named for Dr. Gustavo Orcés V. of the Escuela Politécnica Nacional, Ecuador, through whose efforts many Ecuadorian amphibians and reptiles have been added to the collections of the Natural History Museum of Stanford University and who presented the type specimen of the new species to us.

#### A KEY TO THE STRIPED MEMBERS OF THE *ATRACTUS TRI-LINEATUS* GROUP KNOWN FROM ECUADOR.

1a. Dorsal scales in 17 rows.

2a. Ventrals plus caudals less than 210 (range 164-196).

3a. No ventral longitudinal stripes or dorsolateral blotches, although dorsolateral stripes present.

4a. No vertebral stripe; maxillary teeth 8; hemipenes in males extending to level of 12th caudal.....*A. ecuadorensis*.

4b. A vertebral stripe; maxillary teeth 6; hemipenes in males extending to level of 18th caudal.....*A. occidentalis*.

3b. Ventral longitudinal stripes and dorsolateral blotches present.

5a. A vertebral stripe present; ventrals plus caudals 164.....*A. dunni*.

5b. No ventral stripe; ventrals plus caudals 194-196.....*A. collaris*.

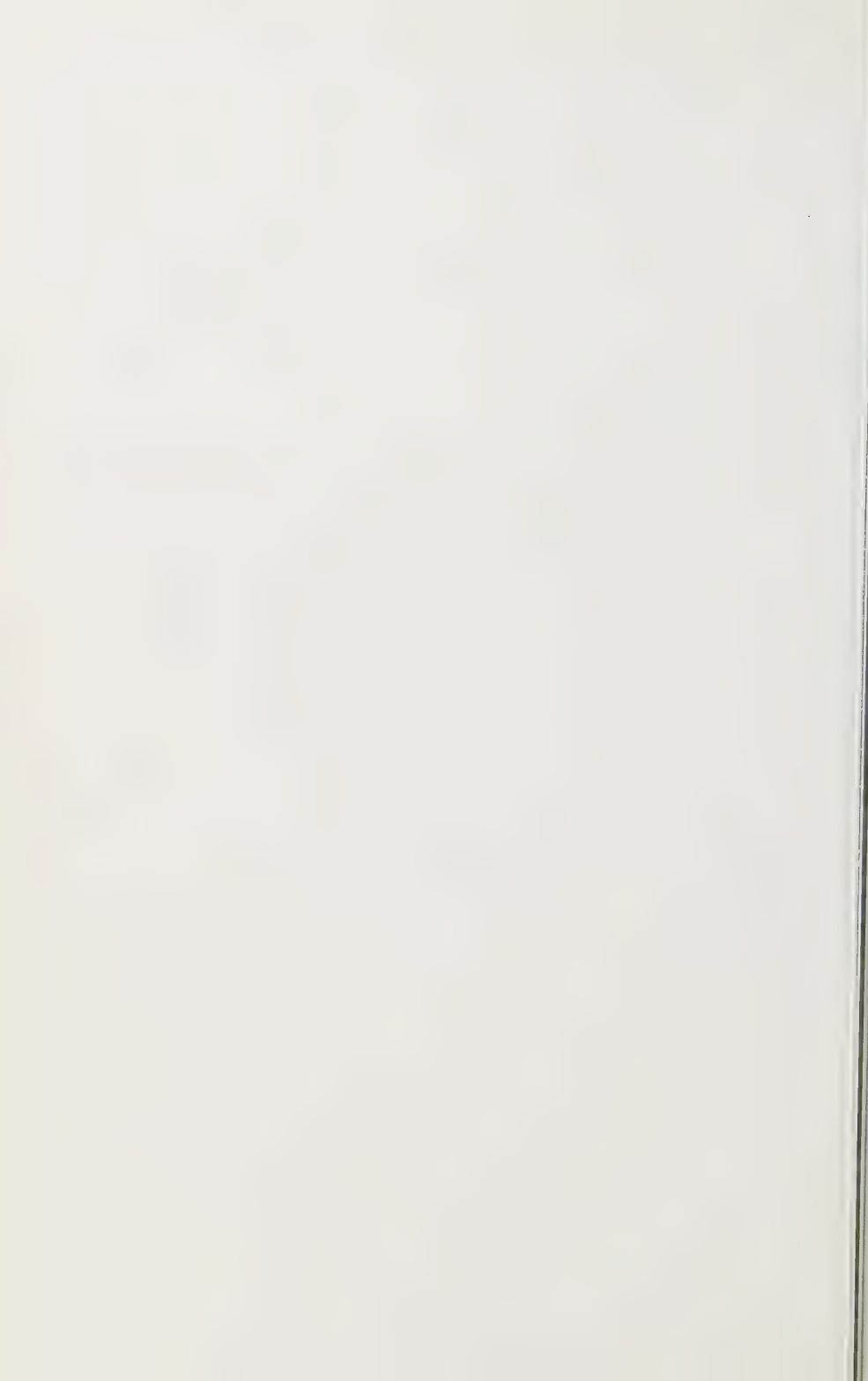
- 2b. Ventrals plus caudals 210 or more (range 222-240).....*A. gaigeae*.  
1b. Dorsal scales in 15 rows.  
6a. No vertebral or lateral stripes; ventrals plus caudals 175-182;  
supralabials 8; maxillary teeth 8; four infralabials meet a chin  
shield on each side .....*A. duboisi*.  
6b. Vertebral and lateral stripes present; ventrals plus caudals 185;  
supralabials 7; maxillary teeth 7; three infralabials contact a chin  
shield on each side.....*A. orcesi*.

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PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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NEW RECORDS AND DESCRIPTIONS OF  
POLYDESMOID MILLIPEDS (ORDER POLYDESMIDA)  
FROM THE EASTERN UNITED STATES

BY NELL B. CAUSEY  
*Fayetteville, Arkansas*

Holotypes of the species described here will be deposited in the permanent collection of the American Museum of Natural History. Paratypes and other specimens, except those from Kentucky, are in the collection of the author. The Kentucky specimens were collected chiefly by the late Prof. Harrison Garman and are the property of the Department of Entomology and Botany, University of Kentucky. All specimens for which no collectors are mentioned were taken by the author with the assistance of Dr. David Causey.

Family Polydesmidae

Genus *Pseudopolydesmus* Attems 1898

*Pseudopolydesmus minor* (Bollman)

*Polydesmus minor* Bollman, 1888. Ent. Amer. 4:2 (Little Rock, Pulaski Co., Arkansas).

*Pseudopolydesmus minor*, Chamberlin, 1942. Bull. U. Utah, biol. ser. 6(8):19, fig. 32.

Record: *Arkansas*, Desha Co., McGehee, numerous specimens under logs on a burnt over area, Jan. 7, 1954.

*Pseudopolydesmus pinetorum* (Bollman)

*Polydesmus pinetorum* Bollman, 1888, Ent. Amer. 4:2-3 (Little Rock, Pulaski Co., Arkansas).

*Pseudopolydesmus pinetorum*, Causey, 1952, Nat. Hist. Misc. 106:6, fig. 5.

Records: *Arkansas*: Dallas Co., Princeton, Jan. 7, 1954. *Kansas*: Riley Co., Apr. 2, 1952, L. O. Warren. *Kentucky*: Jefferson Co., Louisville, Apr. 4, 1922, F. E. Merriman, "ground just covered with these;" Fayette Co., Lexington, Mar. 17, 1922, Arthur Stone.

*Pseudopolydesmus serratus* (Say)

*Polydesmus serratus* Say, 1821, Jour. Philadelphia Acad. Sci. 2:106-107.

*Pseudopolydesmus serratus*, Causey, 1952, Nat. Hist. Misc., 106:6.

Records: *Kentucky*: Anderson Co., Tyrone; Carstian Co., Hopkins-

ville; Fayette Co., Lexington, H. Garman; Fulton Co., Hickman, collector unknown. *Mississippi*: Lincoln Co., 12 miles east of Brookhaven, Dec. 25, 1953.

Genus *Scytonotus* C. L. Koch 1847  
*Scytonotus granulatus* (Say)

*Polydesmus granulatus* Say, 1821, Jour. Philadelphia Acad. Sci. 2: 107 (Pennsylvania).

*Scytonotus granulatus*, Cook and Cook, 1895, Ann. New York Acad. Sci. 8(5):238-246, figs. 46-62.

Records: *Kentucky*: Fayette Co., Lexington, Apr. 9, 1892, Feb. 25, Mar. 2, 1895; Hopkins Co., Nortonville, Mar. 8, 1891, H. Garman.

Family Euryuridae Pocock

Euryuridae, Hoffman, 1951, Proc. U. S. Nat. Mus. 102(3300):235-243.

As a rule, the three genera of the Family Euryuridae that are known in the United States are most abundant in the states that border on the Mississippi and Ohio rivers. Species of *Auturus* tend to occur west of the Mississippi River, species of *Euryurus* east of it, while *Singuliurus* is known only from the type locality in Mississippi. Since the somatic characters are so close in these three genera, they are best separated by the gonopods of adult males, as in the following key:

- |                                                                                                                                                  |                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 1 (2) Tibio-tarsal region of gonopods much shorter than prefemoro-femoral region, the divisions of the bifid apex coarse and of even width ..... | <i>Auturus</i>     |
| 2 (1) Tibio-tarsal region almost as long as prefemoro-femoral region; if the apex is bifid the division are narrow and are of even width .....   | 3                  |
| 3 (4) Apex of tibio-tarsus bifid .....                                                                                                           | <i>Euryurus</i>    |
| 4 (3) Apex of tibio-tarsus simple .....                                                                                                          | <i>Singuliurus</i> |

Genus *Auturus* Chamberlin 1942  
*Auturus evides* (Bollman)

*Paradesmus evides* Bollman, 1887, Ent. Amer. 2:229 (Winona, Winona Co., Minnesota).

*Auturus evides*, Chamberlin, 1942, Bull. U. Utah, biol. ser. 6(8):7.

*Auturus florus* Causey, 1950, Ent. News 61(2):37-38, figs. 1, 2.

Records: *Wisconsin*: Pierce Co., Maiden Rock, one male, one female; July 5, 1954, L. and H. W. Levi. *Missouri*: St. Louis Co.; one male, one female, larvae, Mar. 9, 1952, E. P. Meiners. *Illinois*: Vermillion Co., Oakwood, one male, May 1, 1943, A. H. Ross. *Arkansas*: Polk Co., Rich Mt., one male, three females, Apr. 25, 1953; Washington Co., Fayetteville, numerous specimens.

*Auturus louisiana* (Chamberlin)

*Euryurus louisiana* Chamberlin, 1918, Ann. Ent. Soc. Amer. 11:371 (Creston, Natchitoches Par., Louisiana).

Records: *Louisiana*, Natchitoches Par., Grand Ecure, Feb. 28, 1954, one male, J. E. Sublette. *Arkansas*: Clark Co., Arkadelphia, Apr. 15, 1953; Polk Co., Shady Lane Recreational Area, one male, one female, Herndon Dowling; Sevier Co., Wilton, Dec. 22, 1950, one male, one larva. Garland Co., Hot Springs, one male, May 10, 1951, Ruth Crozier.

***Auturus mcclurkini*, new species**

Figure 1

*Diagnosis:* Gonopods distinguished from those of all other species of the genus by the curvature in the prefemur-femur and the slightly longer tibio-tarsus.

*Male holotype:* Width 3.2 mm., length about 22 mm. Colors not developed. Details of the exoskeleton are typical of the genus. Anterior angles of segments two through 18 have the usual minute tooth, and the apex of the anal tergite is broad, with the lateral and caudal margins straight and the corners narrowly rounded. Gonopods also typical of the genus, but the bend in the prefemur-femur is unusual. *In situ* the basal halves of the telopodites are parallel; beyond the bend the direction is meso-ventrad, so they cross at about the end of the femur. Prefemur-femur incompletely setose, as shown in figure 1; tibio-tarsus is a bright amber color, contrasting with the pale yellow of the remainder of the telopodite.

*Type locality:* Tennessee, Jackson Co., Jackson, in rotting log, one male, Apr. 18, 1954, Irving McClurkin.

Genus *Euryurus* C. L. Koch 1847

*Euryurus aculeatus* (Causey)

*Polydesmus erythropygus* (Brandt), McNeill, 1887, Proc. U. S. Natl. Mus. 10:329, fig. 9.

*Eutheatus aculeatus* Causey, 1952, Nat. Hist. Misc. 106:9-10, fig. 8 (Giant City State Park, Madison Co., Illinois).

Records: *Kentucky*, Carstian Co., Hopkinsville, Nov. 1, 1890; Anderson Co., Tyrone, Apr. 23, July 14, 1892; Fayette Co., Lexington, May 5, 1890; Hopkins Co., Nortonville, Mar. 8, 1881; Powell Co., Natural Bridge, July 21, 1912; Jessamine Co., High Bridge, Jan. 8, 1892; all collected by H. Garman. *Indiana*, Monroe Co., Morgan-Monroe State Park, Oct. 20, 1953, B. G. Owen.

Genus ***Singulius***, new genus

Resembles *Euryurus* Attems 1938 in the elongated tibio-tarsal region of the male gonopods. Differs from that genus in that the apex of the telopodite is simple rather than bifid and in the absence of a protrusion at the junction of the prefemoro-femoral and tibio-tarsal regions. Apparently indistinguishable from both *Euryurus* and *Auturus* in somatic characters and in habitat, which is rotting wood.

Generotype: *Singulius mississippiensis*, new species.

***Singulius mississippiensis*, new species**

Figure 2

*Male holotype:* Width 4 mm., length 27 mm. Colors as in related genera, i. e., triangular areas on the keels and a medial, oval spot on the metazonites are red-orange, the remainder of the dorsum is olive-black, and the legs and venter are white. Other somatic characters are so typical it is doubtful whether any will be useful as diagnostic criteria.

*In situ* the telopodites of the gonopods are directed cephalad, but the tibio-tarsal region curves mesiad and lies contiguous and parallel with

its mate. As shown in figure 2, the prefemoro-femoral region is setose on the mesial and ventral surfaces, and the tibio-tarsal region is glabrous. There is no enlargement at the junction of these two regions, nor any irregularity in the curvature of the seminal canal there. The seminal canal opens at the apex. The coxae of the gonopods are connected by a short, flexible suture along the ventro-medial surface.

*Type locality*: Mississippi, Jackson Co., Van Cleave, in rotting log in mixed woods, two males, three larvae of 19 segments, Jan. 1, 1954.

Family Xystodesmidae  
Genus *Cheiropus* Loomis 1944

Loomis regards this genus as being closely related to *Zinaria*; however, I find that the stouter body, the absence of sternal processes adjacent to the legs, and the spined coxae are indicative of a closer position to *Apheloria* and its allies than to *Zinaria*.

*Cheiropus plancus* Loomis

*Cheiropus plancus* Loomis, 1944, *Psyche* 51(3-4):171-172, fig. 3 (Thomasville, Thomas Co., Georgia).

Record: *Florida*, Leon Co., Tallahassee, 2202 Amelia Circle, one male, width 9 mm., one female, width 9.6 mm., Harold J. Humm, June 30, 1952.

The color is as follows: caudolateral two-thirds of keels, a wide band across the caudal margin of the metazonites, and a band completely around the collum are red-orange; remainder of dorsum black; head and antennae brown; venter and legs cream.

Genus *Epeloria* Chamberlin 1939  
*Epeloria bimaculata* (McNeill)

*Polydesmus bimaculatus* McNeill, 1887, *Proc. U. S. Natl. Mus.* 10:323, pl. 11, figs. 3, 4, [?]<sup>5</sup> (Pensacola, Escambia Co., Florida).

*Spathoria bimaculata*, Chamberlin, 1939, *Bull. U. Utah, biol. ser.*, 5(3):6.

Records: *Florida*, Escambia Co., Pensacola, Cantonment, Molino, under live oaks, Jan. 5, 1954, width of males 6.3-7.6 mm., width of females 6.8-7.4 mm. *Alabama*, Mobile Co., Grand Bay, Alabama Port, June 17, 1953; Spring Hill, Mar., Apr. 1954, mixed woods, width of males 6.3-8.3 mm., width of females 6.3-9 mm. *Mississippi*, Jackson Co., Pascagoula, June 16, 1953; Van Cleave, Jan. 1, 1954, mixed woods, width of males 7.6-7.8 mm., width of females 8.1-8.4 mm.

The populations from the several sites show slight variation in the following details of the gonopods: depth of cleft, width and curvature of both apical branches, abundance and length of setae, length of prefemoral branch. They fall into three geographical groups that may merit subspecific recognition when the genus is better known.

*Epeloria fictus* Chamberlin

*Epeloria fictus* Chamberlin, 1943, *Proc. Biol. Soc. Wash.* 56:37-38, fig. 11 (Thomasville, Thomas Co., Georgia).

Record: *Florida*, Leon Co., Tallahassee, June 1953, male, width 6.9 mm., female, width 8 mm., Harold J. Humm.

Genus *Pachydesmus* Cook 1896  
*Pachydesmus clarus* (Chamberlin)

*Fontaria clara* Chamberlin, 1918, Ann. Ent. Soc. Amer. 11:372 (Creston, Natchitoches Par., Louisiana).

*Pachydesmus clarus*, Loomis and Hoffman, 1948, Proc. Biol. Soc. Wash. 61:53.

Records: *Louisiana*, Lincoln Par., Ruston, Feb. 15, 1952, W. J. Harman; *La Salle Par.*, Jena, Feb. 28, 1954, J. Stone.

The fully developed color is as follows: dorsum black-brown, keels coral, venter and legs pale yellow. Sternites and coxae unspined; metazonites coriaceous, prozonites smooth.

Genus *Apheloria* Chamberlin 1939  
*Apheloria adela* Chamberlin

*Apheloria adela* Chamberlin, 1939, Bull. U. Utah, biol. ser., 5(3):10, pl. 4, fig. 34 (Ithaca, Tompkins Co., New York).

Record: *West Virginia*, Pendelton Co., Seneca Rocks, hardwood sawdust pile, Apr. 3, 1954, one male, width 9.8 mm., W. J. Harman.

The color is as follows: legs, keels, and narrow bands on margins of metazonites yellow, remainder of dorsum brown.

*Apheloria pinicola* Chamberlin

*Apheloria pinicola* Chamberlin, 1947, Proc. Acad. Natl. Sci. Phila. 99:26, figs. 6, 7 (Pine Mountain, Harlan Co., Kentucky).

Record: *Kentucky*, Bell Co., Pineville, June 15, 1892, H. Garman, two males, width 9.9 mm.

After long preservation and drying the dorsum is brown, and the entire keels and small, medial, oval areas on the metazonites are yellow; in one specimen the collum has four yellow spots, and in the other there are three. The gonopods of this species and of *A. reducta* Chamberlin, 1939, appear to be indistinguishable.

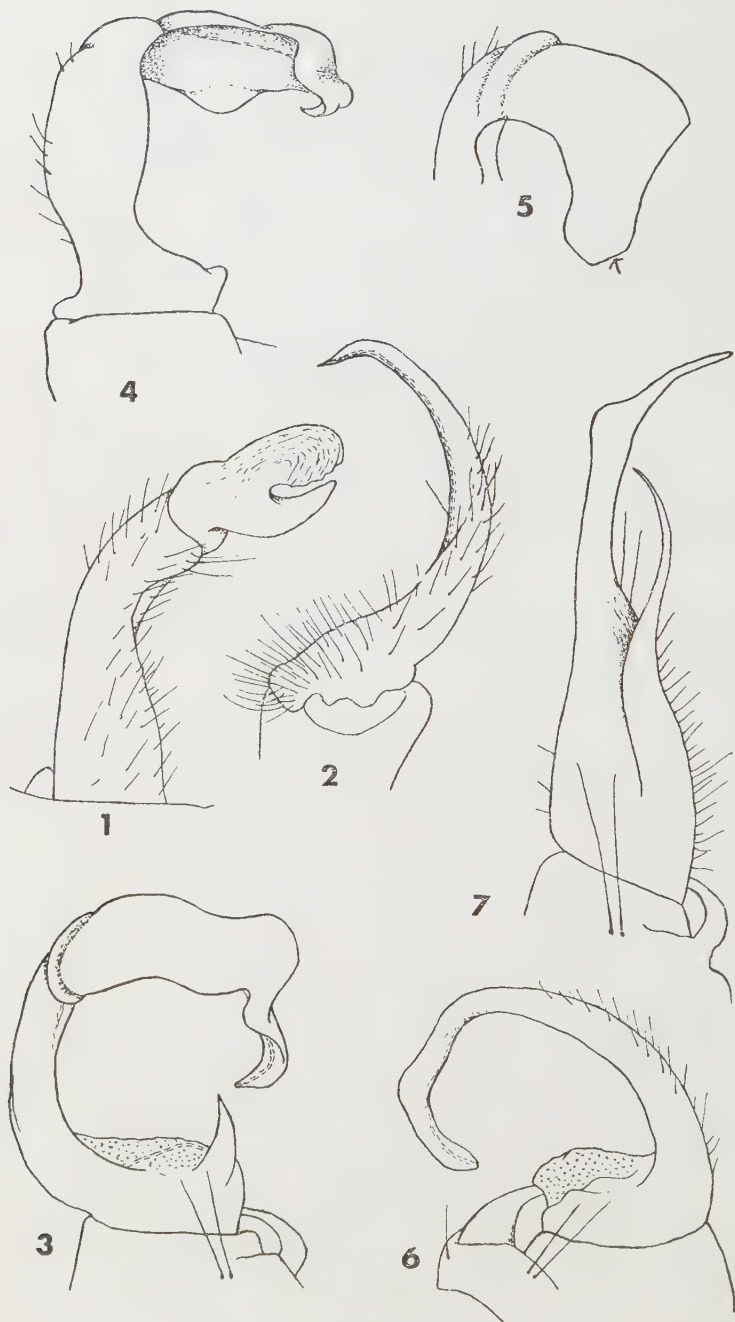
Genus *Brachoria* Chamberlin 1939  
*Brachoria electa*, new species

Figure 3

*Diagnosis*: Gonopods closely resemble those of *B. etholeta* Chamberlin, 1942, but differ in being more massive and in having a right angle bend at about the middle of the region distad of the transverse furrow.

*Male holotype*: Width 9.6 mm. No traces of color remain. Keels wide, continuing the slope of the dorsum. Segments 6 through 14 of uniform width. Anterior margin of collum concentric; caudal margin almost straight; anterior margin with a marginal sulcus from the level of the eyes to the caudal margin. Keels of collum extend slightly ventrad of the keels of the second segment. Keels of segments 2 through 19 with a welt on the anterior and lateral margins; pores open dorsad through the welts. Anterior angles of all keels rounded, becoming more so on the posterior segments. Posterior angles of all anterior keels either slightly obtuse or right angles, with the apex narrowly rounded; beginning with segment 16 the posterior angles are acute, and the apex is narrowly rounded. Keels of segment 19 two-thirds as broad and long as those of





18. Anal tergite triangular, the apex narrow, truncated. Mesial margins of anal valves raised; anal scale broadly triangular. Sternites smooth, glabrous; sternites between legs 4, 5, and 6 each with a pair of low mounds; sternites of segments 8 through 17 produced in a ridge, sharp in the middle, between the second legs of each segment. Coxae of all legs behind the eighth with a short, stout spine. Second article of legs with the usual long spine.

Gonopods so broad and heavy they resemble species of *Tucoria*. *In situ* they are directed mesio-cephalad, crossing in the region of the transverse ridge. The narrowed apical region curves mesio-dorsal, so the apices of the two gonopods almost touch. A cephalic view is shown in figure 3. When viewed from below, the region of the telopodite proximad of the transverse ridge is seen to be sigmoidally curved.

*Type locality*: Kentucky, Anderson Co., Tyrone, one male, Apr. 28, 1892, H. Garman.

#### *Brachoria ethotela* Chamberlin

*Brachoria ethotela* Chamberlin, 1942, Bull. U. Utah, biol. ser. 6(8):5, pl. 2, fig. 13 (Marion, Smyth Co., Virginia).

Records: *Kentucky*, Fayette Co., Lexington, Oct. 1, 1894, one male, width 7 mm., under stones; July 16, 1894, one female, width 12 mm., H. Garman; June 21, 1920, one female, width 9 mm., H. H. Jewett. Madison Co., Richmond road at Kentucky River, May 30, 1892, one male, width 8.3 mm., length about 38 mm. Powell Co., Natural Bridge, May 5, 1895, one male, width 9.1 mm.; Oct. 21, 1911, one male, width 10.1 mm., H. Garman.

#### Genus *Tucoria* Chamberlin 1943

A key to the genus *Tucoria* was published by Hoffman (1948). The species described here is the fifth known for the genus, all from Kentucky. The closely related genus *Brachoria* is more widely distributed, with species from Maryland to Mississippi. The most reliable character by which to separate the two genera is the nature of the prefemoral process of the male gonopods. In all species of *Brachoria* this process is well developed, cylindrical, acute; while in *Tucoria* it is variable, either almost absent, peg-like, or triangular. In most species of *Brachoria* the

#### EXPLANATION OF FIGURES

Fig. 1. *Auturus mcclurkini*, new species. Caudal view of telopodite of right gonopod *in situ*.

Fig. 2. *Singuliuirus mississippiensis*, new genus and species. Ventral view of left gonopod.

Fig. 3. *Brachoria electa*, new species. Cephalic view of telopodite of left gonopod.

Figs. 4, 5. *Tucoria calceata*, new species. 4. Lateral view of telopodite of left gonopod. 5. Anterior view of distal region of left gonopod.

Fig. 6. *Rudiloria mohicana*, new genus and species. Dorsal view of telopodite of right gonopod.

Fig. 7. *Cibularia profuga*, new species. Subdorsal view of telopodite of left gonopod.

region of the telopodite beyond the transverse ridge is narrow and elongated, but in some it approaches the width that is characteristic of *Tucoria* species.

***Tucoria calceata*, new species**

Figures 4 and 5

*Diagnosis:* Gonopods closely resemble those of *T. kentuckiana* (Causey, 1942), but are distinguished by the boot-like shape, as viewed from in front, of the region of the telopodite beyond the transverse ridge.

*Male holotype:* Width 10 mm. No traces of the color remain. Characteristics of the exoskeleton are as described above for *Brachoria electa*.

Gonopods heavy, with the usual transverse ridge and rather obscure apical piece (Fig. 4). *In situ* they are directed mesocephalad, so the mates cross twice, first just below the transverse ridge, and second at the apex. From an anterior view (Fig. 5) the region beyond the transverse ridge is roughly boot-shaped, and the small apical piece, which is attached at the point indicated by the arrow, is not visible. From a lateral view (Fig. 4) the apical process is easily visible and the slight, profemoral protuberance can be seen.

*Type locality:* Kentucky, Anderson Co., Tyrone, one male, Apr. 28, 1892 H. Garman; in the same collection as the holotype of *Brachoria electa*.

**Genus *Rudiloria*, new genus**

Resembles *Apheloria* Chamberlin, 1939, in the spined coxae, the absence of sternal processes, and in the long, curved telopodite of the male gonopods. Differs from that genus in the smaller body size and especially in the absence of a prefemoral spur or process on the telopodite of the male gonopods. Other generic characters are given in the description of the genotype, *R. mohicana*, new species.

*Fontaria oblonga* Koch, 1847, from Pennsylvania is tentatively referred to this genus.

***Rudiloria mohicana*, new species**

Figure 6

*Male holotype:* Width 6 mm., length about 27 mm. After two years in alcohol the colors are as follows: legs and venter yellow-tan; head, antennae, and dorsum, except for the keels and bands, brown; entire margin of collum yellow; caudal half of caudal tergite yellow; yellow bands of almost uniform width cover the caudal one-third or one-half of the metatergites and are confluent with the yellow triangles, which cover the disto-lateral two-thirds of the keels. Keels wide, continuing the slope of the dorsum as in *Apheloria*. Pores open dorsad or latero-dorsad through the marginal welts. Anterior angles of all keels rounded, more so caudad. Caudal angles of keels of segments 2 through 14 are either a little obtuse or right angles; the keels of segments 15 through 19 are acute, becoming more so caudad; the apex of all keels is narrowly rounded. Keels of segment 19 about one-half as long and two-thirds as wide as those of segment 18. Anal tergite triangular, the apex narrowly truncate. Metazonites finely coriaceous; prozonites smooth. Sternites

smooth, glabrous. Sternites between legs 4, 5, and 6 each with a pair of low mounds. On segments behind the gonopods, there is a slight indication of a sternal spine adjacent to the second pair of legs. Beginning with the legs of about the ninth segment, the coxae bear very short spines. As usual the spines of the second segment are much longer, becoming more so caudad.

Gonopods (Fig. 6) long, strongly curved as in *Apheloria* species. The distal differentiation of the telopodite closely resembles that of *A. picta* Hoffman, 1949. There is no indication of a prefemoral process. *In situ* the telopodites are directed meso-cephalad; they cross each other and then curve dorsad.

*Type locality*: Ohio, Ashland Co., Mohican State Park, one male, Aug. 1951, Leroy Gray.

Genus *Cibularia* Chamberlin and Hoffman 1950

*Cibularia profuga*, new species

Figure 7

*Diagnosis*: Distal region of acropodite of telopodite abruptly constricted on lateral surface, thus distinguishing this species from *C. tuobita* (Chamberlin, 1910), in which this piece is gradually attenuated.

*Male holotype*: Width 5.1 mm., length 20 mm. Color as follows: orange triangles on keels, dorsum weak black-brown; venter, legs, and antennae cream. Tergites smooth. Dorsum moderately arched, the keels continuing the slope. Very little of prozonites exposed. Keels of most segments rectangular and very close to the adjacent keels. Keels of segments 2 through 4 directed laterad. Anterior angles of all keels rounded; posterior angles of all keels right except the last 4 or 5 pairs, where they are acute. Keels of segment 18 twice as long and broad as those of segment 19. Anal tergite triangular, the apex narrowly truncate. Annal valves strongly raised along mesial margin. Legs and sternites sparsely setose. Coxae and sternites unspined. Second article of all legs behind gonopods spined. Sternites between legs 3 and 4 each with a pair of inconspicuous, blunt processes.

A subdorsal view of the telopodite of the left gonopod is shown in figure 7. *In situ* the telopodites are subparallel, with both branches crossing each other near the apices. On the ventral surface the telopodite is setose almost one-half its length. Beyond the constriction, or heel, the apical region curves gently dorsad; the apical region of the prefemoral branch curves gently ventrad. The seminal canal opens at the apex of the acropodite.

*Female paratype*: Width 5.3 mm., length 22 mm. Color incompletely developed. Skeletal details are as in the male except that the posterior angles of the keels become acute on segment 13 rather than on 15 or 16.

*Type locality*: Arkansas, Montgomery Co., Mt. Ida, five miles south of the Ouachita River bridge, Apr. 14, 1954, three males, three females, one larva, under rocks.

This is the first record of any member of this genus from any state other than New Mexico. The facies, although very difficult to draw or describe, suggests close relationship with *Zinaria* Chamberlin, 1939.

Genus *Mimuloria* Chamberlin 1928

*Mimuloria* Chamberlin, 1928, Ent. News 39:155. Causey, 1952, Nat. Hist. Misc. 106:7-8.

In this genus the male gonopods are distinguished from those of the closely related *Nannaria* Chamberlin, 1918, by (1) the keel, which is set at a right angle to the end of the telopodite and (2) the flattened, triangular prefemoral branch, usually bearing processes.

*Mimuloria castanea* (McNeill)

*Polydesmus castaneus* McNeill, 1887, Proc. U. S. Natl. Mus. 10:329, pl. 12, fig. 8 (Bloomington, Monroe Co., Indiana).

Records: *Indiana*, Monroe Co., Bloomington, three males, width 4 mm., one female, width 4.7 mm., R. W. Siegel. *Missouri*, St. Louis Co., one male, width 3.6 mm., Mar. 9, 1952, E. P. Meiners

Not one of my specimens from Bloomington shows the apex of the telopodite exactly as figured by McNeill; in all of them a keel is attached at a right angle to the flattened end of the telopodite. The St. Louis specimen corresponds closely to the Bloomington specimens in the shape of the prefemoral branch and its short processes; this character may be expected to show some variation when the species is better known.

*Mimuloria davidcauseyi* (Causey)

*Nannaria davidcauseyi* Causey, 1950, Ent. News 61(7):194, figs. 3, 4 (Jasper, Newton Co., Arkansas).

Records: *Kentucky*, Fayette Co., Lexington, one male, width 3.4 mm., Apr. 27, 1891; one male, May 18, 1892.

This species is known only from Arkansas and Kentucky. It differs from *M. castanea* principally in the prefemoral branch of the telopodite, which has a robust spine at least half as long as the distance from the origin of the spine to the end of the keel.







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STUDIES ON SPIROBOLOID MILLIPEDS.  
II. A SECOND PAPER ON THE GENUS  
*EURHINOCRICUS*

BY RICHARD L. HOFFMAN

My previous treatment of the genus *Eurhinocricus* (1953, Proc. Biol. Soc. Washington, 66: 179-183) rediagnosed the genus on the basis of gonopod structure, and admitted four species to the group in its emended sense. However, quite a few species of rhinocricids which, because of the shape of the posterior gonopod, should have been referred to *Eurhinocricus*, were omitted. These neglected millipeds included five described by Verhoeff and Chamberlin and simply overlooked; three published while the manuscript of my paper was in press; and a considerable number of West Indian species which had been inadequately described and whose identity was until quite recently unknown.

The forms belonging to the last category all are Jamaican, and represented in a rich and valuable collection loaned to me for study by Mr. C. Bernard Lewis, Director of the Institute of Jamaica. These species will be thoroughly treated in a systematic account of the diplopods of Jamaica, now in preparation. In my previous paper (*op. cit.*, p. 181) I wrote concerning one diagnostic character: "The usual transverse sulcus is replaced by a secondary one lying in front of the repugnatorial pores (a characteristic shared, however, with certain West Indian species of *Rhinocricus*).'' Inasmuch as the Antillean species referred to have proved to be congeneric with *E. biolleyi*, the peculiarity may now be regarded as one exclusive with *Eurhinocricus*.

As treated in my summary, *Eurhinocricus* consisted of the following species:

|                               |               |
|-------------------------------|---------------|
| <i>E. biolleyi</i> Brolemann  | Cocos Islands |
| <i>E. omitemae</i> Pocock     | Guerrero      |
| <i>E. tidius</i> (Chamberlin) | California    |
| <i>E. parvissimus</i> Hoffman | Chiapas       |

In all of these forms, the posterior gonopod is a somewhat shortened appendage, its distal segment composed of a long, acicular solenomerite arising very near the coxal articulation, and two slender subparallel rods joined by a membrane. This plan is very constant, and is practically identical in all of the above named species as well as the others listed below. It will be noted that the occurrence of these species in widely

separated, high-altitude localities along the main Cordilleran uplift suggests a strong likelihood of reliction.

It is accordingly of exceptional zoogeographic interest to record the discovery that *Eurhinocricus* is the dominant spirobolid genus occurring on Jamaica, a circumstance affording the first good evidence of the relationship of the fauna of that island with the millipeds of the Central American mainland. In the rich material sent for study by the Institute of Jamaica, I find that at least eight established species of earlier workers are referable to *Eurhinocricus*, as well as an equal number of undescribed forms.

In the first paper of this series I proposed to base generic categories almost entirely upon sexual characters, to the exclusion of such developments as the number of antennal sensory cones, which, although quite useful for identification, occur in many forms which are entirely unrelated in gonopod structure. From the results of my study of the Jamaican collections, it would appear that still another superficial characteristic must be put aside as regards its utility as a generic distinction. This is the presence or absence of scobinae. There is no correlation between the incidence of those cavities and the configuration of the posterior gonopods; scobinae are present on some of the *Eurhinocricus* forms but not on others, a state of things duplicated in the case of typical *Rhinocricus* species (in both genera, Jamaican forms are now known in which scobinae are present in one sex and absent from the other!). The genus *Cubobolus* was set up by Chamberlin in 1918 for the West Indian rhinocricids lacking scobinae, and has embraced in the past about a half dozen forms widely divergent in size, structure, and distribution. Chamberlin himself regarded *Cubobolus* as a category of convenience, and remarked that it might have to be withdrawn into *Rhinocricus*. As I am ignorant of the sexual characters of *Cubobolus beliganus*, the generotype, I am unable to say whether the name is a synonym of *Rhinocricus* or of *Eurhinocricus*, but suspect that it belongs with the former, as *beliganus* is a Cuban species and no eurhinocricids are presently known to occur on that island.

The following list represents an attempt to account for all of the species described to date which appear to be referable to *Eurhinocricus*. That many others remain to be collected and described cannot be doubted.

#### Genus *Eurhinocricus* Brolemann

*Eurhinocricus* Brolemann, 1903, Ann. Soc. Ent. France, vol. 72, p. 131.—Pocock, 1907, Biol. Centr.-Amer., Dipl., pp. 68, 73.—Hoffman, 1952, Proc. Biol. Soc. Washington, vol. 66, pp. 179-183.

*Type*.—*E. biolleyi* Brolemann, by original designation.

*Range*.—Middle America, from southern California south to Panama; Jamaica.

*Species*.—20.

#### *Eurhinocricus barrios* Chamberlin

*Eurhinocricus barrios* Chamberlin, 1953, Amer. Midl. Nat., vol. 50, p. 138, figs. 11, 12.

*Type locality*.—Escobas, opposite Point Barrios, Guatemala.

*Range*.—Known only from the type locality.

*Eurhinocricus biolleyi* Brolemann

*Rhinocricus* (*Eurhinocricus*) *biolleyi* Brolemann, 1903, Ann. soc. ent. France, vol. 72, p. 132, pl. 1, figs. 1-6.—Pocock, 1907, Biologia Centrali-Americana, Diplopoda, p. 72.

*Rhinocricus wheeleri* Chamberlin, 1922, Proc. U. S. Nat. Mus., vol. 60, art. 8, p. 21, pl. 10, figs. 1-3 (type locality: Port Limon, Costa Rica).

*Rhinocricus cocos* Chamberlin, 1947, Proc. Acad. Nat. Sci. Philadelphia, vol. 99, p. 38, figs. 27, 28 (type locality: Chatham Bay, Cocos Islands).

*Eurhinocricus biolleyi* Hoffman, 1953, Proc. Biol. Soc. Washington, vol. 66, p. 182.

Type locality.—Cocos Islands.

Range.—Costa Rica, probably introduced into the Cocos Islands.

Synonymy.—I have already suggested that *cocos* is a synonym of *biolleyi*, since the type specimens of both are from the same place and since there is nothing in the descriptions and illustrations of the two that would indicate any significant differences.

In describing *E. wheeleri*, Chamberlin wrote "This form differs from other Central American species in having an anterior or secondary sulcus deeply impressed across dorsum, whereas the primary sulcus is obliterated above." But such a condition had already been noted in the description of *biolleyi*, and was repeated by Pocock in the Biologia! The gonopods of *wheeleri*, *cocos*, and *biolleyi* are identical, as can be ascertained by reference to illustrations given in the works cited above. Nor is there any difference between the three in size or segment number.

*Eurhinocricus chichivacus* Chamberlin

*Eurhinocricus chichivacus* Chamberlin, 1953, Amer. Midl. Nat., vol. 50, p. 139, figs. 1, 2.

Type locality.—Chichivac, near Teepam, Guatemala.

Range.—Known only from the type locality.

*Eurhinocricus cingendus* (Loomis)

*Rhinocricus cingendus* Loomis, 1937, Bull. Mus. Comp. Zool., vol. 80, p. 218, figs. 5, 6.

Type locality.—Main Ridge, Blue Mountains, Jamaica.

Range.—The Blue Mountains, St. Andrew Parish, Jamaica.

*Eurhinocricus cockerelli* (Pocock)

*Rhinocricus cockerelli* Pocock, 1894, Journ. Linnean Soc. London, (Zool. Ser.), vol. 24, p. 505.

Type locality.—Mandeville, Manchester Parish, Jamaica.

Range.—Central and eastern parishes of Jamaica, at lower elevations.

*Eurhinocricus eutypus* Chamberlin

*Eurhinocricus eutypus* Chamberlin, 1953, Amer. Midl. Nat., vol. 50, p. 139, figs. 21, 22.

Type locality.—Volcan Tajumulco, Guatemala.

Range.—Known only from the type locality.



*Eurhinocricus fissus* Verhoeff

*Eurhinocricus fissus* Verhoeff, 1937, Zool. Anz., vol. 118, p. 97.

Type locality.—Sierra de la Victoria, between Todos Santos and Miraflores, Baja California.

Range.—Known only from the type locality.

*Eurhinocricus gossei* (Pocock)

*Rhinocricus gossei* Pocock, 1894, Journ. Linnean Soc. London, (Zool. Ser.) vol. 24, p. 490, pl. 38, fig. 2.—Chamberlin, 1918, Bull. Mus. Comp. Zool., vol. 62, p. 186.

*Cubobolus gossei* Chamberlin, 1922, Proc. U. S. Nat. Mus., vol. 61, art. 10, p. 10.

Type locality.—Jamaica.

Range.—Western end of Jamaica, in the Bluefields Mountains and vicinity.

*Eurhinocricus heteroscopus* (Chamberlin)

*Rhinocricus heteroscopus* Chamberlin, 1918, Bull. Mus. Comp. Zool., vol. 62, p. 194.

Type locality.—Liguanea Plain, Jamaica.

Range.—Lower portions of St. Andrew and adjoining parishes, Jamaica.

*Eurhinocricus insulatus* (Chamberlin)

*Rhinocricus insulatus* Chamberlin, 1925, Proc. Biol. Soc. Washington, vol. 38, p. 39.

Type locality.—Barro Colorado Island, Panama.

Range.—Known only from the type locality.

*Eurhinocricus mandevillei* (Pocock)

*Rhinocricus mandevillei* Pocock, 1894, Journ. Linnean Soc. London, (Zool. Ser.), vol. 24, p. 489.

Type locality.—Mandeville, Manchester Parish, Jamaica.

Range.—Central parishes of Jamaica.

*Eurhinocricus omiltemae* (Pocock)

*Rhinocricus omiltemae* Pocock, 1907, Biologia Centrali-Americana, Diplopoda, p. 67, pl. 6, figs. 12a-c.

Type locality.—Omilteme, Guerrero.

Range.—Known only from the type locality.

*Eurhinocricus parvior* (Chamberlin)

*Rhinocricus parvior* Chamberlin, 1918, Bull. Mus. Comp. Zool., Vol. 62, p. 191.

Type locality.—Liguanea Plain, Jamaica.

Range.—Known only from the type locality (northern suburbs of Kingston, St. Andrew Parish, Jamaica).

*Eurhinocricus parvissimus* Hoffman

*Eurhinocricus parvissimus* Hoffman, 1953, Proc. Biol. Soc. Washington, vol. 66, p. 182, figs. 1, 2.

Type locality.—Volcan de Tacana, above Cacahuatan, Chiapas.

Range.—Known only from the type locality.

*Eurhinocricus pygmoides* (Chamberlin)

*Rhinocricus pygmoides* Chamberlin, 1933, Pan-Pacific Entom., vol. 9, p. 22 (2 figs.).

Type locality.—Parismina, Costa Rica.

Range.—Known only from the type locality.

*Eurhinocricus sabulosus* (Pocock)

*Rhinocricus sabulosus* Pocock, 1894, Journ. Linnean Soc. London (Zool. Ser.), vol. 24, p. 504, pl. 38, fig. 12.

Type locality.—Mandeville, Manchester Parish, Jamaica.

Range.—Central and eastern parishes of Jamaica, along the southern half of the island.

*Eurhinocricus solitarius* (Pocock)

*Rhinocricus solitarius* Pocock, 1894, Journ. Linnean Soc. London, (Zool. Ser.), vol. 24, p. 496, pl. 38, fig. 6.

Type locality.—Jamaica.

Range.—Not known with certainty; probably the central parishes of Jamaica.

*Eurhinocricus storkani* Verhoeff

*Eurhinocricus storkani* Verhoeff, 1937, Zool. Anz., vol. 118, p. 98.

Type locality.—Manzanillo [Colima?] Mexico.

Range.—Known only from the type locality.

*Eurhinocricus townsendi* (Pocock)

*Rhinocricus townsendi* Pocock, 1894, Journ. Linnean Soc. London, (Zool. Ser.), vol. 24, p. 505.

Type locality.—Jamaica.

Range.—North coast of Jamaica; Westmoreland, St. Mary, St. Ann, and Portland parishes.

*Eurhinocricus williamsi* (Chamberlin)

*Rhinocricus williamsi* Chamberlin, 1940, Bull. Univ. Utah, Biol. Ser. vol. 5, no. 6, p. 15.

Type locality.—Barro Colorado Island, C. Z., Panama.

Range.—Known only from the type locality.

Remarks.—This may prove to be a synonym of *E. insulatus*, which was also described from Barro Colorado Island. However, the gonopods of neither form have been illustrated, and assumption of their specific identity seems premature at this time.









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A NEW SUBSPECIES OF *BLARINA BREVICAUDA*  
FROM FLORIDA

BY W. J. HAMILTON, JR.  
*Cornell University*

Field work in February and March, 1954 in the vicinity of Fort Myers, Lee County, Florida resulted in the taking of 27 shorttail shrews in a restricted area. These shrews are recognizably distinct from *Blarina brevicauda peninsulae* and *Blarina brevicauda carolinensis*.

*Blarina brevicauda shermani*, subsp. nov.

*Type*.—Adult female; skin and skull; Cornell University Mammal Collection Number 8026; two miles north of Fort Myers, Lee County, Florida. Collected February 13, 1954, by W. J. Hamilton, Jr., original number 4280. The type has the following measurements (in millimeters): total length, 115; tail, 23; hind foot, 15; condylobasal length, 21.6; cranial breadth, 10.7; interorbital breadth, 5.5; palatal length, 8.8; maxillary breadth, 7.3; maxillary tooth row, 8.3. Weight 14 grams. Skull measurements follow those of Jackson (N. A. Fauna 51, 1928). This shrew is named for Dr. Harley B. Sherman, who has contributed materially to our knowledge of Florida mammalogy.

*Diagnosis*.—A medium sized dark *Blarina*, larger and darker than *peninsulae*. Adult winter pelage darker than other races of *brevicauda*. The dark pelage, without trace of brown, combined with the larger size, both in body proportions and skull, serves to distinguish this *Blarina* from other Florida races. Skull robust, the cranium and rostrum relatively broad.

*Comparisons*.—This presumably isolated subspecies may at once be separated from other recognized Florida forms by its darker pelage and larger size. Comparable measurements of *shermani*, *peninsulae* and *carolinensis*, all from Florida, are presented in Table 1.

*Remarks*.—As with most *Blarinas*, this race occupies a variety of habitat. In 4000 trap nights in the type locality (one mile north of the Edison Bridge that spans the Caloosahatchee River and a quarter mile east of Route 41, specimens were taken in drainage ditches overgrown to grass, and in the tunnels of *Scalopus aquaticus bassi*. All specimens were adult, the males with enlarged testes and most of the females with turgid vagina and swollen uterine horns, although no macroscopic evidence of embryos was apparent. This relatively large shrew appears to occupy an isolated area well removed from *peninsulae* to the north and south. That it has not been previously described suggests a "blind

spot'' in Florida mammal collecting. In the same habitat with this shrew, *Oryzomys*, *Sigmodon*, *Peromyscus gossypinus* and *Cryptotis* were taken. Previous collecting (2000 trap nights) south of the Caloosahatchee River in Fort Myers in the spring of 1939 and 1940 did not yield a *Blarina*. Nor did collecting on Pine Island, Lee County, provide evidence of this shrew in 1954. Presumably it has a general distribution on the west coast of the southern Florida peninsula; this must wait on further collecting. For the loan of specimens, I am indebted to H. B. Sherman, University of Florida; H. E. Anthony, American Museum of Natural History, W. H. Burt, University of Michigan; Viola S. Schantz, Fish and Wildlife Service, and Richard Archbold, Lake Placid, Florida. Comparisons have been made with specimens in the Cornell collection. Paratypes have been deposited in the U. S. National Museum.

TABLE 1. AVERAGE AND EXTREME MEASUREMENTS IN MILLIMETERS OF FLORIDA BLARINA

|                                                                                | Length | Tail | Hind foot | Weight grams | Condyl-basal length | Inter-orbital breadth | Palatal length | Max. breadth | Max. tooth row |
|--------------------------------------------------------------------------------|--------|------|-----------|--------------|---------------------|-----------------------|----------------|--------------|----------------|
| <i>B. b. shermani</i><br>(27 skins and 25 skulls; weights of 27)               | Ave.   | 109  | 23.5      | 14.1         | 13.8                | 21.0                  | 10.8           | 5.5          | 9.0            |
|                                                                                | Max.   | 116  | 25        | 15           | 17.0                | 21.6                  | 11.2           | 5.7          | 9.4            |
|                                                                                | Min.   | 100  | 22        | 13.5         | 11.1                | 20.4                  | 10.4           | 5.4          | 8.7            |
| <i>B. b. peninsulæ</i> <sup>1</sup><br>(21 skins and 7 skulls; weights of 10)  | Ave.   | 97   | 21.3      | 12           | 9.9                 | 20                    | 10.5           | 5.3          | 8.7            |
|                                                                                | Max.   | 110  | 25        | 14           | 11.0                | 20.5                  | 10.6           | 5.4          | 8.9            |
|                                                                                | Min.   | 82   | 18        | 10           | 8.1                 | 19.8                  | 10.2           | 5.2          | 8.5            |
| <i>B. b. carolinensis</i> <sup>2</sup><br>(17 skins and skulls; weights of 11) | Ave.   | 92.2 | 21        | 12.5         | 8.0                 | 19.3                  | 10.3           | 5.2          | 8.1            |
|                                                                                | Max.   | 102  | 26        | 14           | 10.3                | 20.1                  | 10.8           | 5.0          | 8.7            |
|                                                                                | Min.   | 84   | 18        | 11.5         | 5.5                 | 18.1                  | 9.7            | 5.5          | 7.5            |
|                                                                                |        |      |           |              |                     |                       |                |              | 6.2            |
|                                                                                |        |      |           |              |                     |                       |                |              | 6.4            |

<sup>1</sup>The *peninsulæ* examined include topotypes and specimens from Highland and Collier County, Florida.

<sup>2</sup>The *carolinensis* collected in Alachua and Putnam counties, Florida.



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VARIATION IN THE WHITE-THROATED FANTAIL  
FLYCATCHER, *RHIPIDURA ALBICOLLIS*

BY S. DILLON RIPLEY

Study of some eighty-one specimens of the White-throated Fantail Flycatcher, *Rhipidura albicollis*, has been prompted by looking over the collection of birds which Mr. Sálím Ali has recently made in Orissa and eastern central India. For help in assembling this series, my thanks are due not only to Mr. Ali and the Bombay Natural History Society, but also to the authorities of the U. S. National Museum, the Academy of Natural Sciences and the American Museum of Natural History. I am also grateful to Mr. H. G. Deignan for valuable comments.

On bringing together such a representation of the species it became apparent that there was a considerable range of variation in pattern and color. In general the White-throated Fantail Flycatcher is a rather dark, unobtrusively-colored bird, black on the crown and ear coverts, slaty-black on the upper part of the chest, and slate-gray on the breast and abdomen. The back is mouse grey in color and the wings are a dark dull olive brown. There is a broad white superciliary streak, the throat has white tipped feathers with slate colored bases, and the blackish-brown tail is white tipped except for the two central retrices.

Analyzing the differences between the populations, it is possible to recognize certain races which may be listed as follows:

1. a.) *Rhipidura albicollis canescens* (Koelz)

*Leucocirca albicollis canescens* Koelz, 1939, Proc. Biol. Soc. Wash. 52: 68 (Bhadwar, Punjab).

This subspecies is paler, more ashy on the back, breast and belly than the nominate form as it was described by Koelz, although Whistler (1942, Jour. Bombay Nat. Hist. Soc. 43: 35) felt that in series the differences cited by the describer would not stand up. My impression is that birds from the western Himalayas are clinally different in just the characters cited by Koelz and that they occupy a considerable geographic range.

Range.—From Kashmir along the Himalayas to western Nepal at moderate elevations from the edge of the plains up to 6,000 feet in scrub, bamboo clumps and deciduous and evergreen forest, descending in winter to the adjacent plains of west and east Punjab in West Pakistan and India (Jhelum and Ambala). Specimens from Chisapani and Tika-

pur in the Karnali drainage area in west Nepal collected by us on the National Geographic Society-Yale-Smithsonian Institution Expedition in 1948-9, show that this is the meeting place of *canescens* and the typical form. Of four specimens from these adjacent localities, two are typical *albicollis*, while the other two are definitely paler, nearer *canescens*. All four were taken in December and January, no two on the same day.

b) *Rhipidura albicollis albicollis* (Vieillot)

*Platyrrhynchus albicollis* Vieillot, 1818, Nouv. Dict. d'Hist. Nat. 27: 13 (Bengal).

The nominate subspecies, of which I have examined a freshly-collected topotype from Chandpara, a few miles east of Calcutta, is black on the crown, earcoverts and upper breast, and slate gray on the breast and abdomen without paler edges to the feathers. The back is mouse gray.

Range.—From western Nepal east along the Himalayas to Sikkim where intergrades occur with the following form, south in U.P., Bihar and West Bengal to the vicinity of Calcutta, in the lowlands wherever suitable stands of deciduous and evergreen forest and scrub occur. Presumably this form is migratory, occurring in the lowlands in winter, and returning to the Terai, Duars and foothills in the spring.

c) *Rhipidura albicollis stanleyi* Baker

*Rhipidura albicollis stanleyi* Baker, 1916, Bull. Brit. Orn. Club, 36: 81, new name for: *Rhipidura albicollis kempi* Baker, 1913 (September) Rec. Ind. Mus. 8: 275. (Abor Hills), preoccupied by *Rhipidura flabelifera kempi* Mathews and Iredale, 1913 (July 1).

This population of *albicollis*, which Baker later decided was not recognizable (1924, Fauna of British India. Birds, 2: 279), is in fact distinctly darker than the nominate form. The slate black of the upper breast merges more gradually into the slate color of the breast and abdomen than in *albicollis*. The underparts are in general deeper, more purely slate-colored than in *albicollis* and the back color is darker and richer also, very dark mouse gray with an infusion of clove brown. The tail is blackish in tone rather than dark blackish brown. It is perhaps needless to point out that critical examination in this species is really dependent on fresh material. I have seen no topotypes of *stanleyi* from the Abor Hills, but we have material taken from the Mishmi Hills on the 1947 Yale-Smithsonian Expedition, as well as considerable material from Assam in general of even later date.

Range.—From Sikkim where it intergrades with the nominate form, east through Bhutan, Assam, the northeastern Hills of East Pakistan, to northern Burma from the Chin Hills north along the Chindwin drainage system to Myitkina District and north and east to the N'Mai River, in the hills, descending to the adjacent plains in winter.

d) *Rhipidura albicollis orissae*, subsp. nov.

Type.—♂ ad. (Yale Peabody Museum No. 24864), collected December 15, 1949, by Sálím Ali at Toda, Bonai, Orissa. Paratype.—♂ ad. (Bombay Natural History Society Registry No. 16992), collected on the same date by Sálím Ali at the same locality.

Diagnosis.—From *albicollis*, this subspecies differs by being dark olive-brown rather than mouse gray on the back and scapulars, this color



being clearly demarcated on the hind nape, from the rich black of the forehead and crown. Below, *orissae* is slaty on the breast, fading to slate-gray on the abdomen with a distinct patch of buff or cream in the center of the belly, running to the vent. The tips of the tail feathers are creamy buff rather than pure white as in typical *albicollis*. From *canescens* and *stanleyi* this form differs as it does from *albicollis*, being altogether paler, more brownish, and with a noticeable patch on the lower abdomen, in this latter character alone showing an approach to the Javan form, *euryura*.

Range.—Orissa in Boad, Sambalpur, the Simlipal Hills (Mayurbhanj), Keonjhar and Bonai, and presumably in M.P. in the upper Godavari Valley (Bastar) and Raipur, *vide* Ball, (1878, *Stray Feathers*, 7: 211).

e) *Rhipidura albicollis celsa* Riley

*Rhipidura albicollis celsa* Riley, 1929, *Proc. Biol. Soc. Wash.* 42: 166. (Khun Tan, N. Thailand).

Compared to *stanleyi*, *celsa* is a lighter colored bird, the back paler clove-brown, the tail dark brown rather than black. The breast and abdomen are plumbeous, the feathers often tipped or edged with ashy or drab. Although compared to typical *albicollis*, the upper parts of *celsa* are similar, the underparts are distinctly paler, more grayish or plumbeous with the characteristic pale tips on the lower breast and abdomen (13 out of 16 specimens show this in the series). From *canescens* this form may be distinguished by the darker back, although the underparts are very similar, with the sole addition of the pale edging as noted.

Range.—Burma in the extreme NE, east of the N'Mai River (Htaw-gaw), Tenasserim, and presumably the easternmost Shan States, Yunnan and SW. Szechuan in China, Thailand, and Indochina in N. Laos, N. Annam and Tonkin.

f) *Rhipidura albicollis cinerascens* Delacour

*Rhipidura albicollis cinerascens* Delacour, 1927, *Bull. Brit. Orn. Club*, 47: 156 (Djiring, S. Annam).

This form differs from *albicollis* by being paler above and below with a tendency to pale drab tips to the feathers of the abdomen and under tail coverts. Compared to *celsa* it is paler on the back, less olive-tinted, the brown tone more hair brown. Below also it is paler, the abdomen and under tail coverts with feather edgings of drab. This is a paler, less olive-tinted bird on the upper parts than *orissae*, and more plumbeous below with darker drab edgings.

Range.—Indochina in southern Annam.

g) *Rhipidura albicollis atrata* Salvadori

*Rhipidura atrata* Salvadori, 1878, *Ann. Mus. Civ. Genoa*, 14: 203. (Padang, W. Sumatra).

*Rhipidura albicollis robinsoni* Chasen, 1941, *Treubia*, 18, Suppl: 61 (Bukit Fraser, Pahang, Malaya).

Chasen (*t.c. supra.*) separated the Malay Peninsula population of the White-throated Fantail Flycatcher on the basis of the larger white tips to the outer tail feathers. My series does not support his contention, nor can I find any other significant difference between birds from the two areas.

*Atrata* is a darker form than typical *albicollis* both above and below, although it is quite distinct from *stanleyi* in the color of the back which is far more clove brown, rather than dark mouse gray.

Range.—Malaya and Sumatra.

h) *Rhipidura albicollis kinabalu* Chasen

*Rhipidura albicollis kinabalu* Chasen, 1941, *Treubia*, 18, Suppl: 62. (Mt. Kinabalu, British North Borneo)

This form differs from *atrata* only in the lessened area of white on the tail.

Range.—Mount Kinabalu, British North Borneo and north Sarawak south at least to the Kelabit Plateau.

i) *Rhipidura albicollis sarawacensis* Chasen

*Rhipidura albicollis sarawacensis* Chasen, 1941 *Treubia*, 18, Suppl. 62. (Mt. Poi, west Sarawak)

I have not examined specimens of this population which on the basis of the original description sounds like a well-marked form, viz: "upper parts as in *kinabalu*, but under parts including the under tail coverts paler, about as in the typical race. White in the plumage everywhere accentuated. The supercilia broad and extending the full length of the crown; the white tail tips even longer than in *robinsoni* (= *atrata*), and the breast and center of the abdomen mixed with white."

Range.—Mount Poi, west Sarawak.

## Allied Species

### 2. *Rhipidura euryura* S. Müller

*Rhipidura euryura* S. Müller, 1843, in Temminck's *Verh. Nat. Gesch. Land-en Volkenk*: 185, footnote. (Java)

This species seems to me to be a representative form on Java, and I would so include it as a member of the superspecies, *albicollis*. It differs from the other populations of the superspecies in being bluish-slate on the upper and lower surfaces of the body, rather duller below, in having the white tips of the tail feathers reduced to the two outer pairs and in having white on the abdomen and under tail coverts. The thighs are brownish. However, the tendency to increase or reduction of white tips on the tail exists within the species *albicollis*. The increase of white on the lower surface is already heralded in other forms such as *orissae*, and *sarawacensis* (*vide*, Chasen, t.c.). The bluish slate color of the upper and under parts is an accentuation of the trend towards plumbeous in forms such as *celsa*. Like the forms of *albicollis*, the wing and tail feathers and a large area on the head are blackish, and there is a similar broad white superciliary streak.

Chasen (1935, *Bull. Raffles Mus.* No. 11: 175) unaccountably states that he believes that *Rhipidura phoenicura* of Java may be a representative of *albicollis*. I cannot agree with this, feeling that *euryura* is closely allied to *albicollis*. *Phoenicura* with its chestnut rump and tail seems to me closer to some of the Philippine or Papuan species than to the Indo-Malayan Fantails.

Range.—Java. (There are unconfirmed records for the species on Sumatra and Borneo.)

## Measurements

In over seventy of the specimens of this species from all parts of the range, I have been unable to find any measurements which would indicate that there is a significant difference in size within the populations. Individual birds from the mountains of Kashmir (*canescens*) and Yunnan (*celsa*) seem large, but this would be expected according to Bergmann's Rule. Birds from the southern parts of the range do not seem significantly smaller. Wing measurements range from 76-85 mm. (*cinerascens*), to from 70.5-80.5 mm. (*stanleyi*). This encompasses the whole range of variation for the species. Similarly the tail varies from a low of 90 mm. (*euryura*) to 109 mm. (*celsa*), with all other populations fitting within this range. The culmen varies from 11-15 mm. throughout the superspecies.

The single measurement which seems to vary in a significant way among the populations is the length of the white tail tip of the outermost rectrix, measured along the inner web at the shaft. This is listed below:

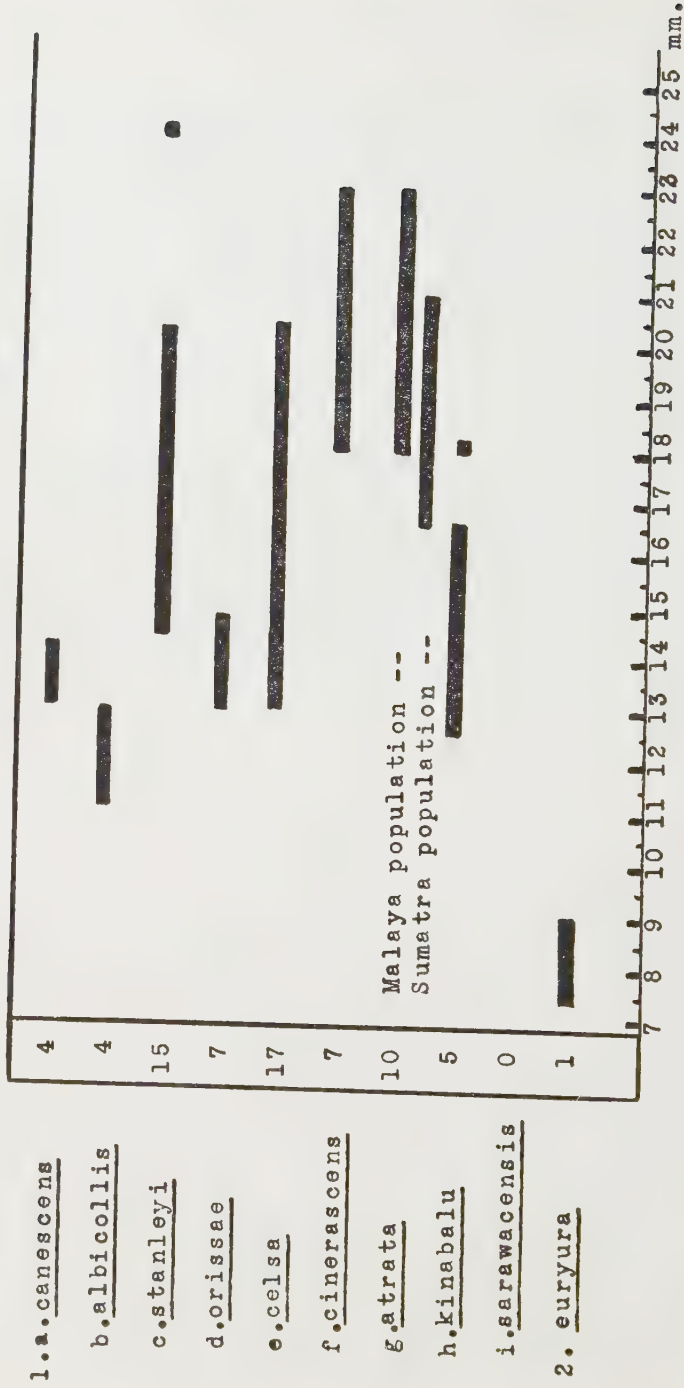
In the above measurements, two single specimens are listed under *stanleyi* and *kinabalu* which fall well outside the range of the others.

From the above it will be seen that *cinerascens* and *atrata* appear to have the greatest extent of white on the tail, while within *atrata* the Sumatran population (*atrata*) overlaps the Malayan population ("rob-insoni") in more than 75% of the specimens measured. On the basis of this series there seems to be a pronounced difference in the size of the white tail area between typical *albicollis* and *stanleyi*, formerly synonymized with it. These differences appear to be nonadaptive, and they do not vary clinally.

Species and  
Subspecies

No. of  
Specimens

Length of white tail tip (mm.)









PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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FIVE NEW VENEZUELAN BIRDS AND NINE  
EXTENSIONS OF RANGES TO COLOMBIA

BY WILLIAM H. PHELPS AND WILLIAM H. PHELPS, JR.

Besides describing new subspecies from our collection, we are extending the ranges of birds from Venezuela to Colombia.

From July 20 to August 9, 1953, Ramón Urbano made a collection on the summit of Cerro Alto del Cedro, Zulía, the easternmost of the Montes de Oca at the northern end of the great Sierra de Perijá which from this point south forms the boundary between Venezuela and Colombia.

Cerro Alto del Cedro is only 450 meters high and has a tropical avifauna. It is partly in Venezuela and partly in Colombia. The international frontier runs across the summit, changing its west to east direction to east of north at the marker on the top. The summit camp was only a few meters from the boundary post. Consequently, the birds collected there were taken on either Venezuelan or Colombian soil and may be considered as of both countries.

A collection was also made at the northern base of the mountain at Hato La Esperanza, 50 meters above sea level, through which the boundary line also passes, the boundary marker being close to the farm house. So, all specimens collected at both localities may be considered as both Venezuelan and Colombian.

Burgua, a locality mentioned several times in this paper, is in the Orinoco watershed in the extreme southwestern corner of the state of Táchira, on the boundary with the state of Apure, about 20 kilometers from the Colombian frontier, in the lowlands drained by the Río Apure. There are open cultivated areas and dense forest. Collections were made from 350 to 530 meters.

Cerro El Teteo rises immediately to the west of Burgua and is on the foothills of the Páramo de Tamá, 30 kilometers to the northwest. It is covered with virgin forest. Collections were made from 800 to 1250 meters. Subtropical species occur there as the land continues to rise to the very high Páramo de Tamá.

We are indebted to the Curators of the collections in the American Museum of Natural History, Carnegie Museum, Chicago Natural History Museum, Museum of Comparative Zoology, Philadelphia Academy of Natural Sciences and the U. S. National Museum for access to their collections.

Specimens listed are in the Phelps Collection, Caracas, unless otherwise specified. Names of colors are capitalized when direct comparison has been made with Ridgway's "Color Standards and Color Nomenclature," 1912. Wing measurements are of the chord.

*Pauxi pauxi gilliardi* Wetmore and Phelps

*Pauxi pauxi gilliardi* Wetmore and Phelps, Journ. Wash. Acad. Sci., 33, No. 5, p. 144, May 15, 1943. (Tierra Nueva, Sierra de Perijá, Magdalena, Colombia.)

1 ♀, Burga (San Luis), Táchira; 500 meters.

Hitherto the species had only been collected in the Venezuelan Andes from the Caracas to the Mérida regions (*P. p. pauxi* (Linné)), the Sierra de Perijá on both the Venezuelan and Colombian sides (*P. p. gilliardi*) and in Bolivia (*P. p. unicornis* Bond and de Schauensee).

However, it has been reported far away from the above range. Hellmayr and Conover<sup>1</sup> say: "The reported occurrence in Cayenne, eastern Perú (Maynas) and Colombia (Santa Marta), as well as in southern Venezuela (banks of the Río Casiquiare and upper Orinoco) has never been corroborated." Selater<sup>2</sup> says: "Natterer heard of this bird's existence when in the upper Río Negro, and has recorded that, according to information received from the natives, it occurs on the Río Casiquiare and adjoining parts of the Orinoco, and is called by the natives 'Pauxi de Piedra,' or Stone Curassow . . . ."

The Burgua bird constitutes the first positive record of the species in the Orinoco watershed lowlands.

*Larus argentatus smithsonianus* Coues

*Larus argentatus smithsonianus* Coues, Proc. Acad. Nat. Sci. Phila., 14, p. 296, 1862. (Eastern and western coasts of North America.)

1 (♂) juv., Isla de Aves, Venezuela.

This specimen constitutes an extension of range of the species to Venezuela.

It was collected on April 18, 1954, on the Phelps-Academia de Ciencias Físicas, Matemáticas y Naturales Expedition to Isla de Aves, on the yacht "Ornis." No other specimens were seen. A number of Laughing Gulls (*Larus atricilla*) were observed but they were not breeding. Several hundred thousands Sooty Terns (*Sterna fuscata*) were breeding as well as a lesser number of Noddies (*Anous stolidus*), which nested on the ground, there being no bushes nor trees.

The Venezuelan "Isla de Aves" is situated about 460 kilometers north of Margarita Island and 180 west of Dominica. It is 600 meters long and its greatest width is 150 meters.

The Herring Gull ranges south during the winter to Panamá, Cuba, Haiti, Jamaica, Virgin Islands and Barbados, according to Bond (Check List of Birds of the West Indies, p. 50, 1950).

*Helianthus amethysticollis verdisutus*, new subspecies

*Type*: From Villa Páez, Páramo de Tamá region, Estado Táchira, Venezuela; 2500 meters. No. 10,810, Phelps Collection, Caracas. Adult male collected February 14, 1941, by Ventura Barnés Jr. (Type on deposit at American Museum of Natural History.)

*Diagnosis*: Nearest to *H. a. violiceps* Phelps and Phelps Jr., of the Perijá Mountains, Venezuela, from which it differs by more greenish,

<sup>1</sup> Birds of the Americas, etc., Part 1, No. 1, p. 119, 1942.

<sup>2</sup> Trans. Zool. Soc. London, 19, Part 4, p. 285, July, 1875.

less bluish frontal shield; from *H. a. clarisse* (Longuemare), eastern Colombia, as well as from the other known races, differs by a coppery purplish crown instead of green uniform with the back.

*Range*: Known from the Páramo de Tamá region of Venezuela and from the Páramo de Tamá, Colombia, in the Subtropical and Temperate Zones at altitudes from 2060 to 3000 meters.

*Description of Type*: Lustrous frontal shield nearest to Cendre Green; crown Dark Livid Purple merging on the nape into the Parrot Green of the back and upper tail-coverts; rump more bronzy; lores and sides of head blackish; a small white postocular spot. Chin blackish; throat lustrous Purple; a white band separating the purple throat from the glittering yellowish green of the lower breast and sides; flanks Parrot Green; feathers of abdomen with greenish centers and buffy margins; lower tail-coverts white with prominent brownish shaft stripes. Remiges Dark Vinaceous Drab; greater wing-coverts dusky greenish; lesser ones greenish bronze uniform with back; greater under wing-coverts uniform with remiges; lesser ones yellowish green. Median rectrices Krombergs Green; remainder blackish with a purplish tinge, the outer two pairs faintly tipped with whitish.

Bill (in life) "black"; feet "black"; iris "dark". Wing, 66.5 mm.; tail, 40; exposed culmen, 17.5; culmen from base, 23; tarsus, 5.

*Remarks*: Sexes unlike in color; the males have longer wings and tails. Size similar to *violiceps* and *clarisse*. Range of measurements: five adult males, including type—wing, 65-66.5 (66.1) mm.; tail, 40-41 (40.2); exposed culmen, 18-18.5 (18.2); four adult females—wing, 59-61.5 (60.4); tail, 36-38 (37); exposed culmen, 19-19 (19). Measurements of *violiceps*: five adult males—wing, 65-71 (69); tail, 38-41 (40.2); exposed culmen, 16-17 (16.5). Five adult [males] of *clarisse*, "Bogotá" skins—wing, 63-75 (69); tail, 40-42 (40.8); exposed culmen, 16-17 (16.8).

The female differs by having the crown green uniform with the back; the gorget bluer and restricted in size, the rest of throat being blackish without iridescence; the wings and tail shorter.

One specimen is a female apparently immature. It differs from the other females in having the gorget still bluer and restricted to a few feathers on the chin; the rest of chin and throat is blackish, the feathers with fine white shaft stripes.

#### *Specimens Examined*

*H. a. violiceps*.—VENEZUELA: Cerro Pejochaina, 14 ♂, 1 [♂]; 1 [♀]; Cerro Tetarí, 2 [♂], 2 ♀, 1 [♀], 1 juv.; Fila Macoíta-Apón, 3 [♂], 1 ♀.

*H. a. verdiscutus*.—VENEZUELA: Páramo de Tamá, 1 ♂, 1 ♂<sup>3</sup>, 1 ♀; Villa Páez, 5 ♂ (inc. type), 2 [♂], 1 ♀, 1 [♀], 1 ♀ juv.; Las Delicias, 1 ♂, 1 ♀. COLOMBIA: Páramo de Tamá, Norte de Santander,<sup>3</sup> 3 ♂, 1 ♂ juv.

*H. a. clarisse*.—COLOMBIA: Cachiri, Santander, 1 ♂<sup>4</sup>; "Colombia," 64; var. locs.<sup>5</sup>, 56<sup>6</sup>.

<sup>3</sup> Specimens in Chicago Natural History Museum.

<sup>4</sup> Specimens in Philadelphia Academy of Natural Sciences.

<sup>5</sup> Specimens in American Museum of Natural History.

<sup>6</sup> For localities see Zimmer, Am. Mus. Nov., No. 1540, p. 28, Dec. 3, 1951.

*H. a. laticlavus*.—ECUADOR<sup>5</sup>: 6<sup>6</sup>.

*H. a. decolor*.—PERÚ<sup>5</sup>: 8<sup>6</sup>

*H. a. amethysticollis*.—PERÚ<sup>5</sup>: 7<sup>6</sup>. BOLIVIA<sup>5</sup>: 4<sup>6</sup>.

*Dendrocicla homochroa meridionalis* Phelps and Phelps Jr.

*Dendrocicla homochroa meridionalis* Phelps and Phelps Jr., Proc. Biol. Soc. Wash., 66, p. 133, August 10, 1953. (Burgua, Táchira.) 4 ♂, 3 ♀, Cerro Alto del Cedro (summit, 450 m.), Colombian boundary.

1 ♂, 1 (♀), Cerro Alto del Cedro (Hato La Esperanza, 50 m.), Colombian boundary.

These specimens constitute an extension of range from northwestern Venezuela to Colombia.

In the original description the range of this subspecies was confined to the upper Apure valley, near the Colombian frontier, in the states of Táchira, Barinas and Apure. In the same publication the population of the Sierra de Perijá, Zulia, in Perijá, and of the extreme northwestern tip of Lara, was called *D. h. ruficeps* Selater and Salvin, of eastern Panamá.

From July 20 to August 9, 1953, the above additional series was obtained. These new specimens show that they cannot be separated from those from the Apure valley, nor from those from Perijá, collected in 1940, and that they are all *meridionalis*. Therefore *ruficeps* ceases to have a Venezuelan range and is confined to eastern Panamá; de Schauensee, in "The Birds of the Republic of Colombia,"<sup>7</sup> does not give a Colombian range to the species *homochroa* so the species jumps across northern Colombia from Panamá to the Venezuelan border.

*Craniolenca subcristata fuscivertex*, new subspecies

*Type*: From Burgua, upper Apure valley, Táchira, Venezuela; 350 meters. No. 58748, Phelps Collection, Caracas. Adult female collected November 16, 1952, by Ramón Urbano. (Type on deposit at the American Museum of Natural History.)

*Diagnosis*: Striping on top of head more prominent, blacker, less brownish, than in the nominate form.

*Range*: Known from two specimens from the headwaters of the Uribante and Apure rivers, near the Colombian frontier.

*Description of Type*: Top of head streaked broadly with Fuscous and very narrowly (edges of feathers) with buffy gray; back Medal Bronze, paler on rump; upper tail-coverts mixed with rufous; post-superciliary stripe grayish; sides of head grayish olive. Chin and anterior throat whitish merging into the Deep Olive-Buff X Dark Olive-Buff of posterior throat, breast, sides and abdomen; flanks, sides and under tail-coverts brownish. Remiges Benzo Brown margined externally with Cinnamon-Rufous, more narrowly and paler on primaries, brighter and more extensive on tertials; inner webs of remiges margined with Light Ochraceous-Salmon, except apically on primaries; primary coverts Benzo Brown margined with Cinnamon-Rufous; median and lesser coverts Cinnamon-Rufous; under wing-coverts and axillaries mixed Orange-Buff and Light Ochraceous—Salmon. Tail Hazel, under surface duller.

Bill (in life) "maxilla brown; mandible flesh color"; feet "greenish

<sup>7</sup> *Caldasia*, 5, Nos. 22-26, pp. 221-214, Sept. 15, 1948-July 1, 1952.

yellow''; iris ''chestnut.'' Wing, 61 mm.; tail, 59; exposed culmen, 12.5; culmen from base, 16.5; tarsus, 18.

*Remarks:* Size similar to *subcristata*. Range of measurements: two adult females, including type—wing, 61-61 (61) mm.; tail, 59-62 (60.5); culmen from base, 16.5-17 (16.7). Measurements of *subcristata*, from the Caracas region: five adult males—wing, 60-65 (62.8); tail, 62-72 (65.6); culmen from base, 15.5-17 (16.2); five adult females—wing, 58-61 (58.8); tail, 60-67 (62.6); culmen from base, 15-17 (15.8).

The second specimen, from Guasqualito, Apure, is similar to the type except that the under parts are lighter, Olive-Buff by Deep Olive-Buff. This new subspecies extends the range of the species from the mountainous north coast region of Venezuela and eastern Colombia to the upper Apure River basin.

#### *Specimens Examined*

*C. s. subcristata*.—VENEZUELA: Zulia—Santa Rosalía, Perijá, 1 ♂; Mene Grande, 1 ♂, 1 ♀. Barinas—Altamira, 2 ♂. Lara—Cubiro, 1 ♂, 1 ♀; Cerro El Cerrón, 1 ♀; Guarico, 1 ♂<sup>8</sup>. Falcón-San Luis, 3 ♂, 2 ♀. Yaracuy—Lagunita de Aroa<sup>8</sup>, 2 ♂ 1 ♀. Carabobo—Sierra de Carabobo, 5 ♂<sup>8</sup>; 1 ♂, 4 ♀; El Trompillo, 1 ♂<sup>8</sup>; Cumbre de Valencia, 1 ♀<sup>5</sup>; Mariara, 1 ♂. Aragua—Ocumare de la Costa, 1 ♂<sup>9</sup>; La Victoria, 1 ♀. Distrito Federal—El Limón<sup>8</sup>, 1 ♂, 2 ♀; Puerto de la Cruz, 1 ♀<sup>8</sup>; El Junquito, 1 ♀; El Valle, 1 ♂; Baruta, 1 ♂; Galipán, 1 ♀<sup>5</sup>; Silla de Caracas, 1 ♂; Caracas<sup>3</sup>, 1 ♂, 3 ♀; Loma Redonda, 2 ♀<sup>8</sup>; Los Caracas, 1 ♀, 1 (?); San José de Los Caracas, 1 ♀. Miranda—Santa Lucía<sup>8</sup>, 1 ♂, 1 ♀; Guarenas, 1 ♂; Petare, 1 (?)<sup>8</sup>; Cerro Golfo Triste, 3 ♂. 1 (?). Anzoátegui—Quebrada Bonita, Bergantín, 2 ♂, 2 ♀. Monagas—Caripe, 2 ♀, 1 (?); Guácharo, 1 (?)<sup>5</sup>; Cerro Negro, 1 ♂. Sucre—Quebrada Seca, 1 ♂<sup>5</sup>; Los Palmales, 1 ♀<sup>5</sup>; Mt. Turumiquire<sup>3</sup>, 7 ♂, 2 ♀, 1 (?); La Elvecia<sup>8</sup>, 1 ♂, 1 ♀; Cumanacoa<sup>8</sup>, 2 ♂, 1 ♀. COLOMBIA: La Colorada, Boyacá, 1 ♂<sup>8</sup>; ''Bogotá'', 2 (?)<sup>5</sup>.

#### *Xenops minutus olivaceus* Aveledo and Pons.

*Xenops minutus olivaceus* Aveledo and Pons, Novedades Científicas, Contrib. Ocasión. Mus. Hist. Nat. La Salle, Ser. Zool., No. 7, p. 9, June, 1952. (Kunana, Río Negro, Perijá, Estado Zulia.)

4 ♂, 3 ♀, 6 (?), Cerro Alto del Cedro (summit, 450 meters), Colombian Boundary.

These specimens constitute an extension of range from the Sierra de Perijá, Venezuela, to Colombia.

Seventeen additional specimens from further south in Río Socuy and Perijá are in the Phelps Collection and 3 in the Pons Collection.

#### *Xenops rutilans perijanus* Phelps and Phelps Jr.

*Xenops rutilans perijanus* Phelps and Phelps Jr., Proc. Biol. Soc. Wash., No. 67, p. 105, June 2, 1954. (Cerro Pejochaina, Alto Río Negro, Sierra de Perijá, Zulia.)

1 (?), Cerro Alto del Cedro (summit, 450 meters), Colombian boundary.

<sup>8</sup> Specimens in Carnegie Museum.

<sup>9</sup> Specimens in U. S. National Museum.



This specimen constitutes an extension of range from the Sierra de Perijá, Venezuela, to Colombia.

From Perijá, further to the south, there are 12 additional specimens in the Phelps Collection, 6 in the Pons Collection and one in the La Salle Collection.

*Dysithamnus mentalis viridis* Aveledo and Pons.

*Dysithamnus mentalis viridis* Aveledo and Pons, Novedades Científicas, Contrib. Ocasión. Mus. Nat. Hist. La Salle, Ser. Zool., No. 7, p. 13, 1952. (Cerro Jamayaujaina, Río Negro, Sierra de Perijá, Zulia.)

6 ♂, 1 ♀, 1 (?), Cerro Alto del Cedro (summit, 450 meters), Colombian boundary.

These specimens constitute an extension of range from the Sierra da Perijá, Zulia, to Colombia.

From further south, in Perijá, there are 23 additional specimens in the Phelps Collection, 16 in the La Salle Collection and 19 in the Pons Collection.

*Myrmeciza immaculata brunnea*, new subspecies

*Type*: From Barranquilla, Sierra de Perijá, Estado Zulia, Venezuela; 960 meters. No. 57616, Phelps Collection, Caracas. Adult female collected March 7, 1953, by Ramón Urbano. (Type on deposit at the American Museum of Natural History.)

*Diagnosis*: Nearest to *M. i. immaculata* (Lafresnaye), from Colombia and Estado Lara, Venezuela, but the female differs from all races by more brownish, less rufous, upper parts; differs additionally from *M. i. berlepschi* Ridgway by more olivaceous, less chestnut, under parts. Male is not separable.

*Description of type*: Back and uropygium more chestnut than Chestnut Brown; crown darker brown merging into blackish of forehead; lores and sides of head blackish; an extensive postorbital bare skin area. Chin dusky; throat Dresden Brown X Prout's Brown, merging into the Cinnamon Brown X Prout's Brown of the rest of the under parts. Remiges Fuscous, outer webs uniform with back, except terminally where they are more dusky; inner tertials and upper wing-coverts uniform with back; tips of feathers on shoulders white; under wing-coverts Fuscous. Tail Fuscous-Black.

Bill (in life) "maxilla black, mandible whitish gray"; feet "black"; iris "brown"; Wing, 75 mm.; tail, 76; exposed culmen, 17; culmen from base, 22; tarsus, 32.

*Remarks*: Sexes different in color but similar in size. Size similar to *immaculata*. Range of measurements: five adult males—wing, 75-79 (77.8) mm.; tail, 80-80 (80); culmen from base, 23-23 (23); four adult females, including type—wing, 74-76 (75.3); tail, 70-78 (75.6); culmen from base, 21.5-23 (22.3). Measurements of *immaculata*: three adult males—wing, 79-81.5 (80.1); tail, 81-85 (83.7); culmen from base, 23-23 (23); five adult females—wing, 79-82 (80.3); tail, 71-78 (75.2); culmen from base, 21-22 (21.6).

The mandibles of the five females (in life as well as in the dried skins collected in 1950 and 1953) are grayish white, while the five females



of *immaculata* in the American Museum of Natural History, collected a long time ago, have yellowish mandibles. Lafresnay's original description of *immaculata* says "mandibula albicante."

*Specimens Examined*

*M. i. zeledoni*<sup>5</sup>.—COSTA RICA: 19. PANAMÁ: Santa Fé, Veraguas, 1 ♂, 6 ♀.

*M. i. berlepschi*<sup>5</sup>.—PANAMÁ: Mt. Tacarcuna, 4 ♂, 5 ♀. COLOMBIA: Baudó, Chocó, 1 ♂, 1 ♀; Alto Bonito, Antioquia, 3 ♂; Lomita Trail, Cauca, 2 ♂, 2 ♀, 3 (?); Salencia, 1 ♂; Las Lomitas, 1 ♂; San José, 2 ♂, 3 ♀; Buenavista, Nariño, 2 ♀; Barbacoas, 10 ♂, 7 ♀; Primavera, west Colombia, 1 ♀. ECUADOR: Cachabí, 4 ♂, 4 ♀; Río de Oro, 1 ♂, 3 ♀; Naranjo, 3 ♀; Mindo, 1 ♂; Santa Rosa, 1 ♀; Gualaca, 1 ♂; Las Piñas, 1 ♂; Bucay, 2 ♂; Chimbo, 6 ♂, 2 ♀; La Chonta, 1 ♀; San Nicolas, 2 ♀; Santo Domingo, 1 ♀.

*M. i. immaculata*.—COLOMBIA: La Frijolera, Antioquia, 2 ♀<sup>5</sup>; Honda<sup>5</sup>, 2 ♂, 1 ♀; Fusugasuga, 1 ♂<sup>5</sup>; "Bogotá," 2 [♂] cotype<sup>10</sup>, 1 [♀] cotype<sup>10</sup>, 1 [♀]<sup>10</sup>, 1 [♀]<sup>5</sup>; no loc., 1 [♂]<sup>10</sup>; east of Palmira, Cauca, 1 ♀<sup>5</sup>.

*M. i. brunnea*.—VENEZUELA: La Sabana, Perijá, Zulia, 2 ♂, 1 ♀; Kunana, 4 ♂; Cerro Pejochaina, 1 ♂; Barranquilla, Perijá, 5 ♂, 4 ♀.

*Formicarius analis griseoventris* Aveledo and Ginés

*Formicarius analis griseoventris* Aveledo and Ginés, Mem. Soc. Cien. Nat., La Salle, 10, No. 26, p. 69, 1950. (Kunana, Sierra de Perijá, Estado Zulia.)

11 ♂, 1 ♀, 3 (?), Cerro Alto del Cedro (summit, 450 meters), Colombian boundary.

These specimens constitute an extension of range from the Maracaibo Lake watershed to Colombia.

14 additional specimens are in the Phelps Collection from Perijá (10) and Mene Grande (1), Zulia; La Fría (2), Táchira; El Vigía (1), Mérida; and from Perijá, 6 in the La Salle Collection and 4 in the Pons Collection.

In the original description of *griseoventris*, *F. a. saturatus* Ridgway was also listed from Perijá localities but reexamination of the new large series from Cerro Alto del Cedro shows that all the Perijá specimens, as well as those from Mene Grande, El Vigía and La Fría are referable to *griseoventris*.

This new series establishes a new and much more distinctive diagnostic character, as against *saturatus*, than the one used in the original description; this new character being: *griseoventris* differs from *saturatus* in having the chestnut collar on the sides of the neck more extensive, brighter and more prominent. It is quite different from *F. a. virescens* Todd of Santa Marta.

Description of immature plumage. Our specimen from Mene Grande is more brownish, less olivaceous above, the chestnut collar on nape is very prominent, the chin and throat are white, the feathers faintly and narrowly edged with brownish and the abdomen is more whitish.

***Pachyramphus cinnamomeus badius*, new subspecies**

*Type*: From Burgua, Campamento Petrolero, Estado Táchira, Venezuela; 350 meters. No. 58866, Phelps Collection, Caracas. Adult male collected November 4, 1952, by Ramón Urbano. (Type on deposit at American Museum of Natural History.)

*Diagnosis*: Differs from *P. c. cinnamomeus* Lawrence, of Panamá to Ecuador, by darker back and uropygium, browner, less cinnamon; and from *P. c. magdalenae* Chapman, of northeastern Colombia and the Maracaibo Lake basin, differs additionally by darker crown and under parts.

*Range*: Known only from the type locality in southern Táchira in the extreme northwestern part of the Apure River watershed in the Orinoco valley, west of the Uribante River, distant from the Colombian border about 25 kilometers, in the Tropical Zone and at altitudes of from 200 to 500 meters.

*Description of type*: Crown Auburn, merging into the Brussels Brown of nape and back, which in turn merges into the Antique Brown of uropygium; lores pale buffy; ear-coverts buffy brownish. Chin white; throat and breast Cinnamon-Buff; abdomen and under tail-coverts Light Ochraceous-Buff; sides of neck, sides and flanks Cinnamon. Primaries and secondaries Fuscous, outer webs, excepting apically, Antique Brown; tertiaries wholly Antique Brown; inner webs of remiges Light Vinaceous-Cinnamon except apically; primary upper wing-coverts Brussels Brown tipped with dusky; rest of upper wing-coverts Brussels Brown, lighter on margins; under wing-coverts and axillaries Cinnamon-Buff. Median rectrices Brussels Brown, the others progressively paler; the outer ones Pinkish-Cinnamon.

Bill (in life) "maxilla black, mandible gray"; feet "greenish gray"; iris "dark." Wing, 78 mm.; tail, 56; exposed culmen, 13.5; culmen from base, 16; tarsus, 19.5.

*Remarks*: Sexes similar in color and size but the male has the second primary from the outside very short and attenuated. Size similar to *magdalenae*. Range of measurements: five adult males, including type—wing, 74-78 (76.3) mm.; tail, 56-59 (57.2); culmen from base, 14-16 (15); five adult females—wing, 74-75 (74.3); tail, 53-58 (55.4); culmen from base, 15-16 (15.7). Measurements of *magdalenae* from Calamar and Jaraquiel, Colombia: five adult males—wing, 73-77 (75.4); tail, 54-57 (54.8); culmen from base, 14.5-16 (15.2); four adult females—wing, 70.5-73 (71.9); tail, 51-55 (53); culmen from base, 15-16 (15.5).

*Specimens Examined*

*P. c. vividior*.—MEXICO: 3<sup>3</sup>. GUATEMALA: 3<sup>5</sup>. NICARAGUA: 10<sup>5</sup>. HONDURAS: 5 (inc. type)<sup>10</sup>. COSTA RICA: 8<sup>10</sup>; 16<sup>5</sup>.

*P. c. cinnamomeus*.—PANAMÁ: 27<sup>5</sup>; 40<sup>10</sup>. COLOMBIA: Sautata, Río Atrato<sup>8</sup>, 1 ♂, 1 ♀; Quibdó<sup>8</sup>, 2 ♂, 1 ♀; Murindo, Antioquia<sup>8</sup>, 2 ♂, 1 ♀; El Tambo, Chocó<sup>8</sup>, 1 ♀; Andagoya<sup>8</sup>, 1 ♂, 1 ♀; Yuntas 2 ♀<sup>5</sup>; Malena, 1 ♂<sup>5</sup>; Noanama<sup>5</sup>, 1 ♂, 1 ♀; Buenaventura, 1 ♂<sup>5</sup>; Alto Bonito, 1 ♂<sup>5</sup>; Bahía de Solano, 2 ♂<sup>5</sup>; Juntas de Tamana, 1 ♂<sup>5</sup>; Puerto Valdivia<sup>5</sup>, 2 ♂, 3 ♀; Barbacoas<sup>5</sup>, 4 ♂, 2 ♀, 1 (♀); Honda, 1 ♀<sup>5</sup>; Los

<sup>10</sup> Specimens in Museum of Comparative Zoology.

Cisneros, 1 ♂<sup>5</sup>; San José<sup>5</sup>, 2 ♂, 2 ♀; Buena Vista, 1 ♀<sup>5</sup>; "Bogotá"<sup>5</sup>, 1 [♂], 2 [♀]. ECUADOR: 18<sup>5</sup>.

*P. c. magdalenae*.—COLOMBIA: Santa Marta, 1 ♂<sup>10</sup>, 5 ♂<sup>8</sup>, 4 ♀<sup>8</sup>, 1 (?)<sup>8</sup>; Neshi, Antioquia, 3 ♂<sup>3</sup>; Alta Vista, 1 ♂<sup>3</sup>; Cuturú<sup>3</sup>, 2 ♂, 1 ♀; Calamar<sup>8</sup>, 3 ♂, 2 ♀; Jaraquiel<sup>8</sup>, 2 ♂, 2 ♀; Gamarra, Magdalena<sup>8</sup>, 1 ♂, 1 ♀; Algodonal, 1 (type)<sup>5</sup>; El Tambor, Santander, 1 ♂<sup>8</sup>; Bucaramanga, 1 ♂<sup>8</sup>; Cúcuta, 1 ♀<sup>3</sup>. VENEZUELA: Machiques, Perijá, Zulia, 3 ♀; San Rafael, 1 ♂, 1 (?); La Sabana, 1 (?); La Sierra, 1 ♀; Barranquilla, 1 ♂; Santa Bárbara, Zulia, 2 ♂, 3 ♀; Encontrados<sup>3</sup>, 1 ♂, 2 ♀; Mene Grande, 1 ♀; Oropé, Táchira<sup>3</sup>, 2 ♂, 1 ♀; Seboruco, 1 ♂, 1 ♀; La Fria, 5 ♂, 3 ♀, 1 (?); Mesa Bolívar, 1 ♂; La Azulita, Mérida<sup>3</sup>, 1 ♂, 1 ♀; Santa Elena<sup>8</sup>, 1 ♂, 3 ♀.

*P. c. badius*.—VENEZUELA: Burgua, Táchira, 8 ♂, 6 ♀, 3 (?).

*Piprites chloris perijanus* Phelps and Phelps Jr.

*Piprites chloris perijanus* Phelps and Phelps Jr., Proc. Biol. Soc. Wash., 62, p. 187, Dec. 22, 1949. (La Sabana, Río Negro, Perijá, Zulia.)

3 ♂, 2 ♀, 1 (?), Cerro Alto del Cedro (summit, 450 meters), Colombian boundary.

These specimens constitute an extension of range from the Sierra de Perijá, Venezuela, to Colombia.

After this race was described, on two males from Perijá, eight more specimens have been collected in Perijá besides the above six from further north. This additional material shows that *perijanus* is nearest to *P. c. antioquiae* Chapman from which it differs by a darker back.

*Lophotriccus pileatus santaluciaae* Todd

*Lophotriccus pileatus santaluciaae* Todd, Ann. Carnegie Mus., 32, p. 299, Feb. 15, 1952. (Santa Lucía, Miranda, Venezuela.)

6 ♂, 5 (?), Cerro Alto del Cedro (summit, 450 meters), Colombian boundary.

These specimens constitute an extension of range from northern Venezuela to Colombia.

This race is represented by 29 specimens in the Phelps Collection, 5 in the La Salle Collection and 14 in the Pons Collection; also by the 8 paratypes in the Carnegie Museum. Apparently no form of *L. pileatus* has been previously reported from northern Colombia.

*Pipromorpha oleaginea abdominalis*, new subspecies

*Type*: From Los Caracas, Distrito Federal, Venezuela; near sea level. No. 18148, Phelps Collection, Caracas. Adult [male] collected April 28, 1942, by Ramón Urbano. (Type on deposit at the American Museum of Natural History.)

*Diagnosis*: Differs from all Venezuelan races of *oleaginea* by duller, paler buffy brown abdomen, less yellowish or ochraceous. In color it is nearest to *P. o. dorsalis* Phelps and Phelps Jr., of the Subtropical Zone of Mt. Roraima, from which it differs additionally by lighter olive upper parts, with more of a yellowish tinge. The male differs additionally from *P. o. chloronota* (D'Orbigny and Lafresnaye), *P. o. parca* (Bangs), *P. o. intensa* Zimmer and Phelps and *P. o. pallidiventris* (Hell-

mayr) by darker upper parts, and from the first three by having the outer primaries attenuated and notched.

*Range*: Known from the Caracas region on the coast at sea level and on the interior range of mountains in the Tropical Zone at 600 and 700 meters.

*Description of type*: Head, nape, back and upper rump nearest Dull Citrine, this merging into the Buffy Citrine of lower rump and upper tail-coverts. Chin grayish citrine merging into the Buffy Citrine of breast and then into the near Isabella of abdomen, flanks and under tail-coverts. Wings Benzo Brown; outer webs of primaries and secondaries narrowly edged with grayish olive except apically; inner tertials strongly edged externally and apically with yellowish white; primary coverts Benzo Brown; greater wing-coverts margined with buffy olive forming two poorly defined wing bars; bend of wing buffy; under wing-coverts and axillaries Ochraceous-Buff. Tail lighter than Benzo Brown, paler on under surface; rectrices margined externally with Dull Citrine and very faintly and narrowly tipped with buffy white.

Bill (in life) "black, base of mandible cream"; feet "dark"; iris "brown." Wing, 61 mm.; tail, 44; exposed culmen, 11; culmen from base, 13; tarsus, 15.

*Remarks*: Sexes alike in color but male has attenuated, notched, outer primaries, and longer wing. Range of measurements: two adult males, including the type—wing, 61-61 (61) mm.; tail, 43-44 (43.5); culmen from base, 13-13.5 (13.2); one adult female—wing, 56; tail, 41; culmen from base, 13.5; one specimen of undetermined sex, but probably a female because of wing length—wing, 57; tail, 42; culmen from base, 13.

It would appear that the males of the new race have a shorter tail than the other Venezuelan races but the shortness of the series of *abdominalis* prohibits its use in diagnosis. Five adult males of each of these subspecies show these tail measurements: *chloronota* 44-47 (46.5); *intensa*, 48.5-50 (49.3); *pallidiventris*, 49-51 (50); *parca*, 44-49 (46.8).

Todd<sup>11</sup>, commenting on the generic characters, says "... the outer primaries in many individuals are more or less narrowed terminally, or even distinctly emarginate . . . , the precise character and extent of this modification varying greatly." Our considerable series of four of the six Venezuelan races show that the attenuated and notched outer primaries do have not only a sexual significance but a subspecific one also, at least in Venezuela.

*intensa* (38 skins). Of the 18 sexed males, only 2 have the attenuated primaries. One of these is from Paruima Mission, Kamarang River, British Guiana, and the other from Carabobo, Cuyuni River, near the British Guiana frontier. Inasmuch as the British Guiana subspecies, *P. o. wallacei* Chubb, has attenuated primaries, perhaps our two specimens are intermediates with that subspecies.

*chloronota* (58 skins). None shows attenuated primaries, nor do any of the 98 skins in the American Museum of Natural History.

*parca* (50 skins). None shows attenuated primaries.

*pallidiventris* (53 skins). All of the 19 specimens sexed as males have

<sup>11</sup> Studies in the Tyrannidae. I. A revision of the Genus *Pipromorpha*. Proc. Biol. Soc. Wash., 34, p. 175, Dec. 21, 1921.

attenuated primaries and none of them sexed as females has them.

*dorsalis* (unique type). Not sexed.

*abdominalis* (4 skins). The two males have attenuated primaries, the sexed female has the outer primaries in moult and the unsexed one has them intermediate.

From the above we can deduce that the attenuated primaries in the Venezuelan races are a sexual character and that it can be used in the diagnosis of subspecies inasmuch as it is lacking entirely in *chloronota* and *parca* and almost so in *intensa*, while it is always present in *pallidiventris* and in *abdominalis*.

#### *Specimens Examined*

*P. o. oleaginea*.—BRAZIL: 1<sup>12</sup>.

*P. o. chloronota*.—BOLIVIA: 3<sup>12</sup>. BRAZIL: Rio Castanho, 1 ♂; 42<sup>12</sup>. COLOMBIA: 13<sup>12</sup>. VENEZUELA: 44<sup>13</sup>; 40<sup>14</sup>; Las Bonitas, Apure, 3 ♂, 1 (♀); Burgua, Táchira, 1 ♂, 2 ♀, 1 (♀).

*P. o. hantzwelli*<sup>12</sup>.—ECUADOR: 28. PERÚ: 10.

*P. o. maynana*.—PERÚ: 19<sup>12</sup>.

*P. o. pacifica*.—ECUADOR: 17<sup>12</sup>.

*P. o. wallacei*<sup>12</sup>.—BRAZIL: 46. FRENCH GUIANA: 2. DUTCH GUIANA: 8. BRITISH GUIANA: 6.

*P. o. dorsalis*.—VENEZUELA: Cerro Roraima, 1 (♀), type.

*P. o. intensa*.—VENEZUELA: 30<sup>14</sup>. BRITISH GUIANA: Paruima Mission, 1 ♀.

*P. o. pallidiventris*.—VENEZUELA: 28<sup>12</sup>; 21<sup>14</sup>; Cerro Corona, Sucre, 1 ♂, 1 ♀; Cerro Papelón, 2 ♂, 1 ♀, 8 (?).

*P. o. abdominalis*.—VENEZUELA: Cerro Negro, Miranda, 1 ♂, 1 [♀]; Los Caracas, Dto. Federal, 1 [♂] type, 1 ♀.

*P. o. parca*.—VENEZUELA: 12<sup>14</sup>; Kunana, Perijá, 3 (♀); Barranquilla, 1 ♂; Cerro Alto del Cedro, Zulia, 4 ♂, 4 ♀, 7 (?). COLOMBIA: 40<sup>12</sup>. PANAMÁ: 13<sup>12</sup>.

*P. o. lutescens*.—PANAMÁ: 27<sup>12</sup>.

*P. o. dyscola*.—PANAMÁ: 24<sup>12</sup>.

*P. o. assimilis*<sup>12</sup>.—COSTA RICA: 10. NICARAGUA: 14. GUATEMALA: 53. MEXICO: 4.

#### *Tangara xanthogaster exsul* (Berlepsch)

*Euphonia ruficeps exsul* Berlepsch, Verh. 5th Intern. Orn. Kongr. Berlin, pp. 1017, 1127, 1912. (San Esteban, Venezuela.)

1 (♀), Cerro Alto del Cedro (Hato La Esperanza, 50 meters), Colombian boundary.

This specimen constitutes an extension of range from Venezuela to Colombia. It had been known only from northern Venezuela.

The following specimens in the Phelps Collection are from localities close to the Colombian boundary:

3 ♂, 2 ♀, Cerro Pejochaina, upper Río Negro, Perijá.

<sup>12</sup> Specimens in American Museum of Natural History. For list of specimens and localities, see Zimmer, Am. Mus. Nov., No. 1126, pp. 13, 14, 1941.

<sup>13</sup> idem. For list of specimens and localities, see Zimmer and Phelps, Am. Mus. Nov. No. 1312, p. 17, 1946.

<sup>14</sup> For list of specimens and localities, see Phelps and Phelps Jr., Proc. Biol. Soc. Wash., 65, p. 50, 1952.

1 ♂, 3 ♀, 1 (?), Burgua, Táchira.

The La Salle Collection also has nine specimens from Perijá and the Pons Collection two.

*Rhodinocichla rosea beebei* Phelps and Phelps Jr.

*Rhodinocichla rosea beebei* Phelps and Phelps Jr., Proc. Biol. Soc. Wash., 62, p. 191, Dec. 22, 1949. (La Sabana, Río Negro, Perijá, Zulia.)

1 ♂, 1 ♀, Cerro Alto del Cedro (summit, 450 meters), Colombian boundary.

The above specimens constitute an extension of range from the Sierra de Perijá, Venezuela, to Colombia.

After this race was described, on six specimens in the Phelps, Pons and La Salle collections, 42 additional specimens from Perijá have entered these three collections.

*Chlorospingus canigularis canigularis* (Lafresnaye)

*Tachyphonus canigularis* Lafresnaye, Rev. Zool., 11, p. 11, 1848. (Bogotá.)

1 ♂, 1 ♀, Cerro El Teteo, Burgua, Táchira.

These specimens constitute an extension of range of the species from the western slopes of the eastern Andes of Colombia to Venezuela, in the Subtropical Zone at 1250 meters.



PROCEEDINGS  
OF THE  
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*THRIPS ILLICII*, A PROPOSED EMENDATION  
(Thysanoptera; Thripidae)

J. DOUGLAS HOOD

*Thrips alysi* Hood was described in the Proceedings of the Biological Society of Washington, 67:278 (December 28, 1954), from the flowers of a plant which the collector's label showed to be *Alysium floridana*. There is no plant of that name.

It turns out that the determination of the plant was supplied orally to the collector, and that he, familiar with Sweet Alyssum and not knowing *Illicium floridanum* Ellis (the Florida Anisetree or Polecat Tree), quite understandingly erred in recording the name of the plant.

My hope is that the prompt emendation of the specific name of the thrips, before it has become established in the scientific literature, will incline the International Commission on Zoological Nomenclature, acting under its plenary powers when the case is submitted to them, to make a special exception which will permit the use of ***Thrips illicii*** for the species.



PROCEEDINGS  
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A NEW SPECIES OF CINARA FROM OREGON  
(APHIDAE)

By F. C. HOTTES AND E. O. ESSIG

Mr. L. G. Gentner, who has added several new Aphid records to the Aphid fauna of Oregon, collected the new species described herewith.

*Cinara setulosa* n. sp.

*Apterous viviparous female.*

Size and general color.—Length from vertex to end of anal plate varying from 4.50-5.00 mm. We have no information relative to the color of living specimens. The color is described from cleared mounted specimens. Head and thorax brown, abdomen light tan, cornicles, transverse pigmented spot, cauda and anal plate brown, only slightly darker than abdomen. First and second antennal segments concolorous with head, or but little darker. Third, fourth and fifth antennal segments pale dusky at base becoming darker at apex. Sixth antennal segment mostly dusky, only pale at extreme base. All femora brown, with prothoracic femora darker than femora of meso and metathorax, and with a dark ridge which may be almost black along the dorsum. Tibiae dark brown, with apical regions almost black. Tarsi concolorous with ends of tibiae. Pro and mesothoracic tibiae darker than tibiae of metathorax.

Head and thorax.—Antennal segments with the following lengths: III .47-.55 mm., IV .20-.25 mm., V .23 mm., VI .17-.20 + .05 mm. There are no secondary sensoria present on any of the segments, only the fifth has a large wide rimmed primary sensorium. Antennal hairs sparse, hairs on third segment mixed as to type and length. The shortest hair which are also the finest, are only two thirds the width of the segment in length, or about .03 mm. the longest, darkest and most spine-like hairs are about .06 mm. long. Antennal hairs quite upstanding. The longest hair on the antennae are found on the fourth and fifth segments, there are quite spine-like, but sparse, these segments also have quite short hairs. Rostrum with segments three, four and five extending beyond metathoracic coxae. Last three segments of the rostrum with the following lengths: .28, .26, .10 mm. Median suture of head poorly developed, as a rule failing to reach posterior margin of head.

Dorsum of head with a moderate number of hairs, varying from fine to spine-like, and from .03 mm. or less to about .06 mm., the spine-like hairs being longest. The hairs on the dorsum of the head do not reach the posterior margin of the head. Eyes large, closely applied to head, with almost no stalk. Ocular tubercles prominent, but small. Anterior dorsum of head with surface wrinkled but not setulose. The hind femora vary from 1.50-1.86 mm. in length. Hairs on all femora short, thick and

spine-like, much like those on outer margin of tibiae. Some hairs on the femora are much finer and only half as long as others, these are few in number, some hairs are spine-like, but only one third, or one fourth as long as others. These tack-like hairs are few in number, and are located for the most part on the ventral surface of the femora. All tibiae have the hairs on the inner margin finer and paler than the hairs on the outer margin. On the outer margin the hairs vary from heavy spine-like, dark upstanding hairs, which are subequal to the width of the segment, the ratio of length to width being .07-.10 mm. to hairs only .03 mm. in length. The two types of hairs being intermixed. The hairs on the outer margin of the tibiae are fewer in number than on the inner margin. The hind tibiae vary in length from 2.07-2.43 mm. The hind tarsal segments have the following lengths: .16, .55-.65 mm. The first tarsal segment has about twenty hairs, these are located on the apical two thirds of the segment. The hairs on the ventral surface of the second segment are finer, shorter and more numerous than the hairs on the dorsal surface of the segment. The dorsal surface of the pro and mesothorax are smooth. The surface of the metathorax is so finely setulose that this condition has to be looked for. The mesosternal tubercle is absent.

Abdomen.—Both dorsal and ventral surfaces of the abdomen are characterized by a setulose condition which is well developed, and even better developed in the posterior regions. This condition is without pattern on the dorsal surface. On the ventral surface the setulose condition is arranged in rows which anastomose repeatedly giving this surface a lace-like appearance. Hairs similar on both ventral and dorsal surfaces, all arising from small pigmented spots, but little wider than the base of the hairs. Hairs on the abdomen variable in length, varying from short tack-like hairs to hairs about .09 mm. in length. Anterior to the transverse pigmented spot which is not divided, but indented in the mid region of both the anterior and posterior margins, there are a number of small irregular spots each giving rise to a single hair, such hairs are either short or long. These small pigmented spots have a smooth surface. The surface of the transverse pigmented spot is setulose, the setulose condition being arranged in rows. Hairs on this spot are not numerous, but extend to almost the middle of the spot, they are not arranged in rows. Cauda and anal plate setulose, both provided with long, very fine sharp-pointed hairs. Surface of cornicles smooth, base quite irregular, varying from .30-.40 mm. with the opening forward of center. Surface of cornicles provided with a few spine-like hairs, confined largely to the outer region, and short fine hairs, confined largely to the constricted region of the cornicle, but intermixed with the more spine-like type. Some of the finer hairs on the cornicles are extremely short.

This species has no near allies. It is the only known species described from *Abies* with the setulose condition so well developed, and with various types of hairs on the abdomen and legs. *C. glabra* G&P has much the same setulose condition, but this species has a large smooth patch on the dorsum of the abdomen, and the cornicles are smaller, and the genital plate has more depth. It is taken on pine.

Holotype apterous viviparous female. Taken on *Abies magnifica* var.

*shastensis*. Mt. Ashland, Oregon, Sept. 2, 1954 by L. G. Genter. Deposited in the collection of E. O. Essig.

*Eulachnus brevipilosus* CB.

This very distinctive species is being recorded for the first time from the United States. As indicated by the name, the hair are very short. On the body they might best be described as minute. On the hind tibiae the hair are not only short but enlarged at the tip, only the vertex and dorsum of the head have hair of normal length.

Apterous viviparous females, taken on *Pinus* sp. Seattle, Washington, Oct. 14, 1954. M. J. Forsell, collector.





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A NEW SPECIES OF *CINARA* FROM ARIZONA  
(APHIDAE)

BY F. C. HOTTES AND GEORGE D. BUTLER, JR.

The description of this new species from Arizona adds another species to those known from the host, *Pinus edulis*.

*Cinara apachea* n. sp.

*Alate viviparous female.*

Size and general color.—Length from vertex to end of anal plate varying from 2.14-2.86 mm. Most specimens reach the upper limit in size. Color in life not recorded, but remembered as uniform dark brown and shining, and is so indicated by the mounted material, only the mounted material is somewhat darker than the shade recalled. First and second antennal segment blackish, third, fourth and fifth antennal segments with basal portions yellowish, and apical portions black, the black on segments four and five being equal to about half of segment. Sixth antennal segment uniform black. Thoracic lobes black. Femora yellowish at extreme base, shading to brown which continues to end in the pro and mesothoracic femora, the metathoracic femora quickly become black, following the yellowish base. Pro and mesothoracic tibiae strongly banded with yellow, otherwise brownish-black. Metathoracic tibiae with yellow band indistinct, the yellow being intermixed with dusky, and the band not complete. Cornicles dark dusky brown.

Head and thorax.—Antennal segments with the following lengths: III .45-.50 mm., IV .21-.25 mm., V .21-.25 mm., VI .10-.13 + .04 mm. All antennal segments with primary sensoria. Secondary sensoria distributed as follows: III three to four, IV one, two or three, most common number two, three sensoria present in only one case, V one. Hair on antennae sparse about .03 mm. in length or slightly less, spine-like, set at an angle of about 45 degrees. On the third antennal segment the shortest hair are found near the base of the segment and the longest near the apex, all hair are shorter than one half the width of the segment. Secondary sensoria large, only slightly tuberculate and with narrow rims. Long hair on sixth antennal segment not extending beyond origin of marginal sensoria. Dorsum and vertex of head provided with a moderate number of rather spine-like hairs, which are only slightly longer than those on the third antennal segment. Median suture of head with a row of hair on either side. All femora provided with short spine-like hair, similar to those on the head and antennae and no longer. Hind tibiae varying from 2.65-2.93 mm. in length, provided with extra numerous hairs which are about .03 mm. in length. These hairs are set at an angle of about 45 degrees, but are more inclined from middle to apex. The tibial hair are rather heavy near base, but become extremely

fine towards the apex. The hair are similar on the outer and inner margins of the tibiae. First segment of hind tarsis .10 mm. in length, on the ventral surface there are about ten hairs. The second segment of the hind tarsis is about .26 mm. long, this segment has a few hairs which are alike on both the ventral and dorsal surfaces. Wings with a uniform smoky color, and a scale-like surface. The second fork of the media closer to the margin of the wing than to the first. Rostrum as a rule with segments three, four and five extending beyond metathoracic coxae. Last three segments of the rostrum with the following lengths: .185, .15, .071 mm.

Abdomen.—Cornicles with basal margin very irregular, and the opening acentric, being closer to the posterior margin. Hairs on cornicles extremely sparse and varying from .03 to .05 mm. in length. The hairs near the margin are few in number, very short and stubby and rather coarse. Hair on dorsum of abdomen very sparse, about .03 mm. in length. Hair on ventral surface of abdomen of normal length, and numerous. Pigmented spots anterior to cauda divided, hair on these confined to posterior margin and very coarse and spine-like, from .03 to .05 mm. in length. Genital plate setulose with few hairs and these confined largely to the ends of the plate.

*Apterous viviparous female.*

Length from vertex to end of anal plate varying from 2.93-3.00 mm. Color much like alate viviparous female. Hair on antennae, abdomen and legs similar to that on alate viviparous female. The hair on the femora are also short, and similar to those of the alate. Antennal segments with the following lengths: III .47-.50 mm., IV .17-.18 mm., V .21-.24 mm., VI .13 + .04 mm. All antennal segments have primary sensoria. Secondary sensoria distributed as follows: III none, IV none, V one. Last three segments of the rostrum with the following lengths: .21, .18, .06 mm. Mesosternal tubercle present, but very small. Hind tibiae varying in length from 2.43-2.65 mm. Hind tarsal segments .10 + .21-.26 mm.

Holotype alate viviparous female, Morphotype apterous viviparous female. Host, *Pinus edulis*. Taken at Springerville, Arizona, June 11, 1954. Both types deposited in the United States National Museum.

This species may not be keyed beyond couplet ten in Palmer's "Aphids of the Rocky Mountain Region" because hind tarsal II hardly equals one-tenth the length of the hind tibiae. It is not *C. curvipes*. Nor is the second segment of the tarsis distinctly shorter than one-tenth of the hind tibiae. It is not *C. arizonica*. Nor can the second segment of the hind tarsis be said to be one-tenth or more the length of the hind tibiae. Specimens of *C. apachea* are perhaps most likely to be taken for specimens of *C. schwarzi* (W). They differ from this species as follows: more, and shorter hair on the hind tibiae. The tibial hair are also somewhat curved. Short hair on the hind femora, shorter tarsi, shorter terminal segments of the rostrum, shorter and more spine-like hair on antennae and dorsum of abdomen.

Immature specimens of this species may have been taken at Grand Canyon National Park, but they did not survive the high temperatures to which they were subjected on the return trip to Colorado.





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CINARA DESCRIPTIONS. (APHIDAE)

By F. C. HOTTES

The Aphids described herewith were collected in 1954.

*Cinara chinookiana* n. sp.

*Apterous viviparous female.*

Size and color.—Length from vertex to end of anal plate varying from 3.29-3.50 mm. Color in life not recorded, specimens in alcohol with head and thorax dark brown. Legs dark brown with ends of tibiae and tarsi black or blackish-brown. Abdomen rather pale except for brownish-black cornicles, four rows of wax pore plates and large block shaped pigmented spots anterior to the cauda, which are dark brown. Mounted specimens show the first two segments of the antennae concolorous with the head, segments three, four and five have the apical portions of the segments darker, the sixth segment is dark and uniform in color. The thorax has six large dark brownish block shaped areas on the dorsum, these are arranged in two rows, and it is them that gives the dark color to the thorax.

Head and thorax.—Antennal segments with the following lengths: III .34-.347 mm., IV .143-.157 mm., V .185-.214 mm., VI .143-.171 + .028-.042 mm. Secondary sensoria arranged as follows: III with neither primary or secondary sensoria, IV with primary present, secondary sensoria as a rule absent but one may be present, V primary present, secondary one or two, as a rule one. Primary sensoria on segments five and six large, and apparently with rim poorly developed. Primary sensorium on four not differentiated from secondary except by position. Antennal hair not numerous, that on the third segment consisting of a long upstanding type which is rather coarse, and a shorter, finer type which is more inclined. Hair on first antennal segment very sparse, limited to area near apex of segment. Hairs at extreme base of third and fifth segments very short and extremely fine, this is not true of the hairs near the base of the fourth segment. Long hairs on sixth segment not extending beyond origin of marginal sensoria, hence roughly confined to basal half of segment. Rostrum almost reaching end of meta-thoracic coxae. Last three segments of the rostrum with the following lengths: .16, .157, .057 mm. Ocular tubercles poorly developed. Anterior margin of head arched, median suture present as a fine dark line, which does not reach posterior region of head. Mesosternal tubercle absent. Length of hind tibiae varying from 1.33-1.36 mm., hence rather short. Hair on inner and outer margins of hind tibiae unlike. That on inner margin, finer and shorter than that on outer and less upstanding, and with exceptions, shorter than width of segment, or subequal to width. Hair on this margin near apex of tibiae very numerous, much more inclined and only half as long as that, more basal. Hair on outer margin of tibiae of three types, a spine-like type, set at an angle of about





90 degrees, and about .145 mm. in length. These hairs are not numerous and are spaced from one another at a distance of about their length, or slightly less, the second type of hair is only about half as long as the first, much finer and is set at an angle of about forty-five degrees, the third type of hair is shorter than the second and more inclined; it is not numerous. Hind tarsal segments with the following lengths: .085, .27-.30 mm. The first tarsal segment is somewhat recessed within the end of the tibia, its ventral surface has about nine hairs on its apical two thirds. Hairs on dorsal surface of second tarsal segment much longer, more spine-like, and fewer than those on ventral surface.

Abdomen.—Dorsum of abdomen with numerous dark hairs, these are of two types. A long coarse type, which is dark in color and about .143 mm. in length, and a type only half as long, which is finer in texture and less dark. Both types arise from small pigmented spots. Cornicles with base varying from .37-.45 mm. the outer margin is very irregular. Cornicles with two types of hair, a coarse type restricted in number and confined to outer margin of cornicle for the most part, and a finer type confined more or less to the restricted region of the cornicle, but intermixed with the coarser type. These hairs are numerous. Pigmented spots anterior to cauda large, block shaped, with very irregular margins. Hair on these spots not confined to rows, but scattered on apical half. Cauda and anal plate with two types of hairs which are numerous. Genital plate setulose with numerous long and short hair.

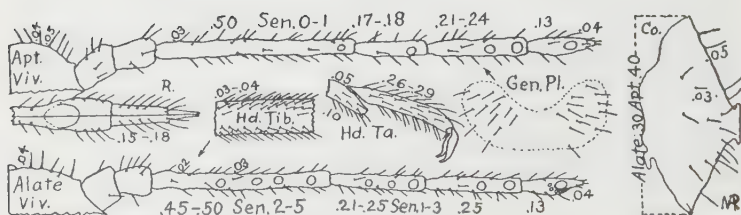
Holotype apterous viviparous female. Deposited in the United States National Museum. Host *Abies lasiocarpa*. Lake Tipsoo, near summit Chinook Pass, Washington. Carl Johansen.

This species does not key satisfactorily in Palmer's key to the genus *Cinara* in "Aphids of the Rocky Mountain Region" and is definitely not included in her book. It differs from *C. lasiocarpae* (G&P) in the absence of pigmented spots on the dorsum of the abdomen, the shorter hair on antennae and legs, the much shorter tibiae, and the larger more block shaped pigmented spots anterior to the cauda. From *C. alacra* H&E it differs in color of tibiae, hair on antennae and legs, and in sensoria.

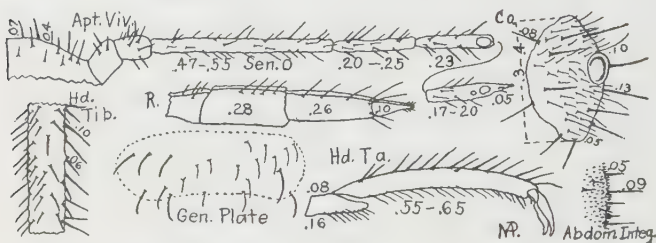
*Cinara puerca* Hottes

*Alate viviparous female.*

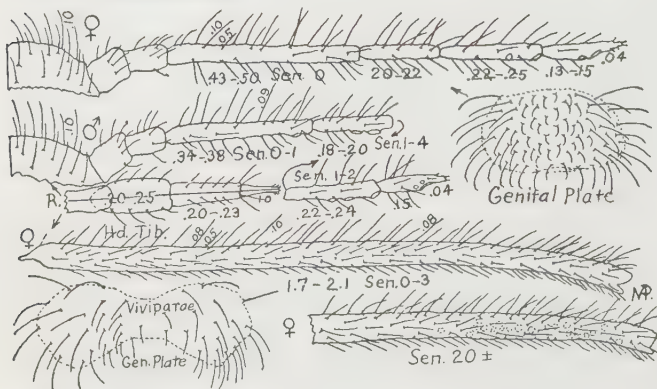
Length from vertex to end of anal plate 3.86 mm. Color similar to that of apterous viviparous female in all respects, and like that form free from all powder. Length of antennal segments as follows: III .57 mm., IV .16 mm., V .26 mm., VI .16 + .028. Sensoria distributed as follows: III, 13 arranged in a more or less straight row except for two smaller tuberculate sensoria. All sensoria with narrow rims. Presence of primary sensorium questioned, if present similar to secondary sensoria and counted as such. IV 1-2 no distinction made between primary and secondary sensoria. V one small secondary sensoria and large primary. Marginal sensoria on VI far removed from primary and arranged in a row, the primary sensorium on this segment is very tuberculate. Hair on first two antennal segments numerous. Hair on third segment numerous and upstanding, the longest hairs on this segment are shorter than the width of the segment. Hair on the fourth and fifth segments less numerous than on the third segment and less upstanding. Eyes as in



**CINARA apasheca H&B.**



**CINARA setulosa H&E.**

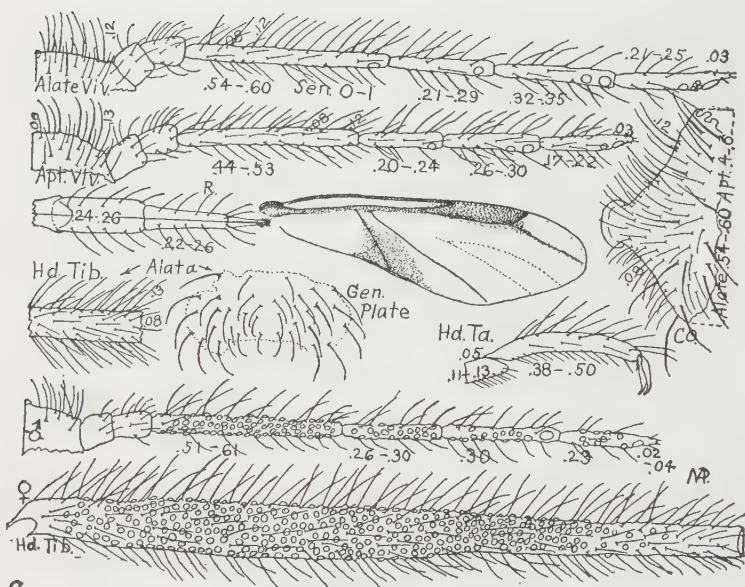


**CINARA hottesi (G&P)**

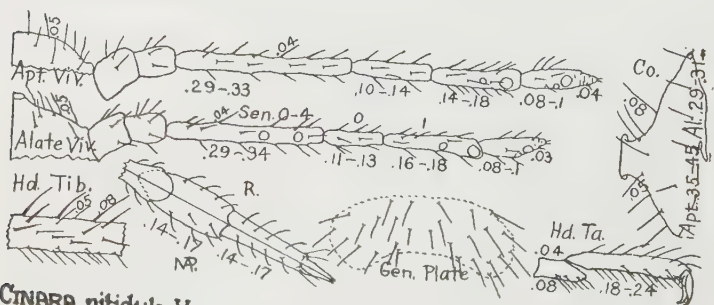
apterous viviparous female, ocular tubercles present but very small. Median suture of head rather narrow, with a short pigmented stripe on either side. Posterior half of head almost free from hair, the few present being no longer than the white area from which they arise, and very difficult to see. Anterior margin of head and anterior dorsum with a moderate number of normal hair. Lateral lobes of thorax with few hairs, these are largely confined to the central portion of the lobes, and are indicated by white areas around their base. Median posterior lobe of thorax, with hair indicated by white clear areas confined to ends of lobe, these hairs are few in number. Stigma dark smoky with a scale-like surface, provided with a few clear areas. End of stigma blunt. Radial sector short, heavy, slightly bent, bordered with smoky. Area of wing in region of end of radial sector rather narrow. Media very faint, once branched, the branch far removed from the margin of the wing. Anal and cubital veins very well developed, heavy, both strongly bordered with smoky, the anal vein ending in a small smoky area. Hind wing more or less smoky. Hind femora 1.43 mm. in length, slightly narrowed before slight bend near basal end. Hind tibiae 2.37 mm. in length. Hair on hind tibiae numerous and upstanding, fine, about as long as width of tibiae, but no longer. First tarsal segment about .11 mm. long, provided with about twenty hairs, but these are not all ventral. The second tarsal segment is .29 mm. in length, it has numerous fine hairs on all surfaces. Dorsum of abdomen with hairs similar to those of apterous viviparous female. Ventral surface of abdomen with numerous long hair. Cornicles with base measuring about .60 mm. Hair on cornicles confined largely to constricted area and surface immediately adjacent. There are a few hairs similar to those on the dorsum of the abdomen on the outer half of the base of the cornicles, they are indicated by clear areas at their base. Pigmented areas anterior to cauda block-like, provided with a row of long hairs on their posterior margins. Hair on cauda confined to posterior half. Genital plate crescent shaped, with mid region free from hair.

Morphotype described from a single specimen, reared on branch of *Pinus edulis*, Grand Junction, Colorado, Dec. 29, 1954. Deposited in the United States National Museum. Specimens of this species were still active in nature Nov. 24, 1954, and still viviparous. I suspect they were still active Dec. 11th although I could not locate them, ants so indicated, their presence.

Despite efforts to induce the production of sexual forms, by subjecting specimens being reared to cold and prolonged darkness, without knowing that either of these factors induce the production of sexual forms, specimens were still viviparous March 7, 1955. I can now add some information regarding the life habits of this species. One large colony living near the origin of a branch was completely covered over by a shed made of clay-like material, constructed by ants. There were two small openings, only large enough for the coming and going of the ants, far too small to permit the escape of adult aphids. Within this shed there were many aphids, and much honey dew, in fact the honey dew was so abundant that some dead aphids were preserved in it. Another colony living in a fissure of trunk bark, was encased by a clay bottle-shaped structure made by ants, this also had two small openings.



*CINARA nimbata* H.



*CINARA nitidula* H.

Within this there was much honey dew, a few live aphids and some dead aphids preserved in the liquid.

*Cinara cognita* Hottes and Essig

*Alate viviparous female.*

Length from vertex to end of anal plate varying from 2.44-3.29 mm. Color in life not known. Length of antennal segments as follows: III .40 mm., IV .17 mm., V .20 mm., VI .12 + .04 mm. Secondary sensoria distributed as follows: III 2-3, primary sensorium present. IV 0-1, primary sensorium present. V 1, primary sensorium present. Longest hair on third antennal segment about as long as width of segment, fine, sparse, upstanding. Long hair on sixth antennal segment confined to region basal to marginal sensoria. Last three segments of the rostrum with the following lengths: .185, .16, .07 mm. Last three segments of the rostrum extending beyond the metathoracic coxae. Media twice branched, second branch closer to the first than to the margin of the wing. All veins lightly bordered with dusky. Hair on lateral lobes of thorax confined largely to the median region of the lobes, absent on more lateral portions. Median posterior lobe of thorax with very few hairs, these confined to central region. Hind femora 1.07 mm. in length. Hind tibiae 1.86 mm. long. Hind tarsal segments not in condition to measure. Outer margin of cornicle base very irregular, about .25-.31 mm. across. Hairs on cornicles confined largely to constricted area, opening of cornicles acentric within base, which may have one or two clear areas. Pigmented spots anterior to cauda widely separated, provided with a row of long hairs on the posterior margin. Hair on dorsum of abdomen exceedingly sparse, confined roughly to transverse rows which are far apart, the individual hairs being spaced from one another by a distance about equal to their length. Hair on ventral surface of abdomen normal. Hair on cauda confined to posterior margin, remainder of cauda faintly setulose. Genital plate with three to four hairs.

Morphotype alate viviparous female, collected on *Juniperus communis* Tundo State Park, Washington. June 23, 1954. The material was sent in by Prof. Carl Johanson, of Pullman, Washington.

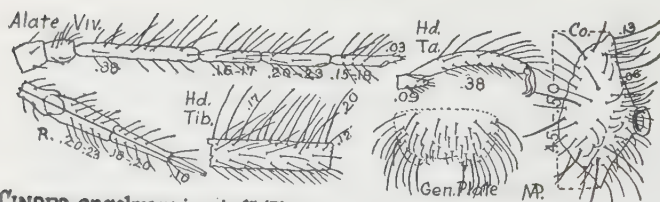
*Cinara lasiocarpae* (Gillette and Palmer)

*Alate male.*

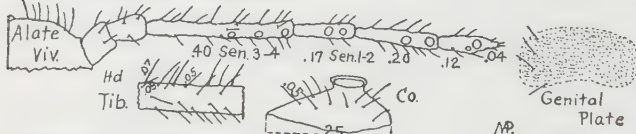
Length from vertex to end of anal plate 2.71 mm. Head dusky black. Thorax dusky brown. Abdomen dusky green with no spots. Cornicles black. Antennae dusky. Femora yellowish at base remainder of femora dusky. Tibiae dusky, with region near base more or less yellowish.

Head and thorax.—Length of antennal segments as follows: III .53 mm., IV .29 mm., V .27 mm., VI .17 + .028 mm. Sensoria distributed as follows: III 48-51, primary sensorium present, like secondary. IV 17, primary sensorium present. V 15, primary present. VI 1. All secondary sensoria small, irregularly arranged and very tuberculate. Hair on antennae about .1 mm. in length, fine, set at an angle of about 45 degrees on third segment, and slightly more on fourth and fifth segments. Rostrum with segments three, four, and five extending beyond metathoracic coxae. Length of last three segments of the rostrum as follows: .24, .185, .085 mm. Media with two forks, second fork closer to

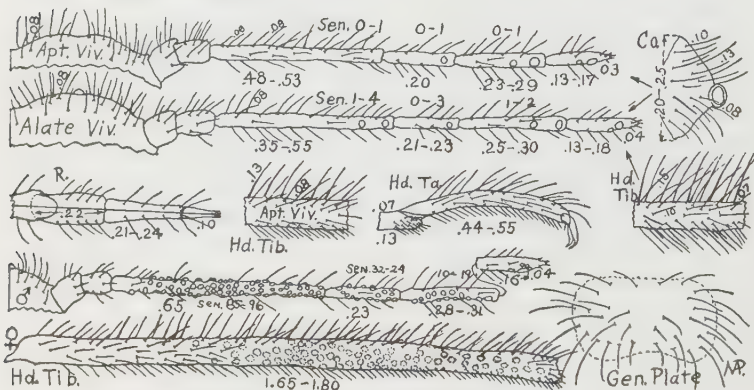




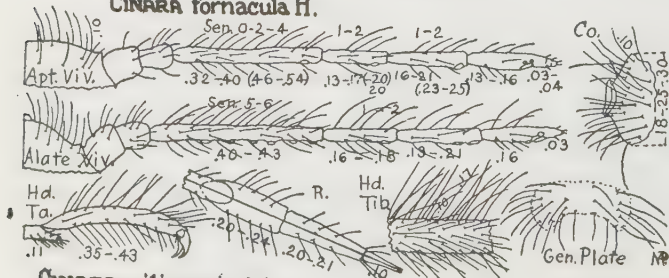
*CINARA engelmanniensis* (G&P)



*CINARA cognita* H&E.



*CINARA fornacula* H.



*CINARA pilicornis* (H).



margin of wing than to first fork. Radial sector and anal vein bordered. Hind tibiae 2.06 mm. in length. Hair on outer margins of hind tibiae .185 mm. in length. Hair on inner margin of hind tibiae much shorter, and less upstanding. First segment of hind tarsis .1 mm. in length, length of second segment of hind tarsis .347 mm. Ventral surface of first tarsal segment with about 15 hairs.

Abdomen.—Cornicle with base measuring about .24 mm. Harpagoes blunt free. Dorsal and ventral surfaces of abdomen with numerous hairs.

Allotype alate male. Reared on branch of *Abies lasiocarpa* Sept. 18, 1954. Deposited in the Collection of the United States National Museum. The specimen described herewith was one of two immature males taken with oviparous females south of Glade Park, Colorado, Sept. 12, 1954. Apparently my rearing methods did not quite satisfy the other male specimen, he wandered off, just as he should have become an adult. Had I not taken the male described here as an immature specimen, associated with females, I would hardly associate him with *C. lasiocarpae*. This is the last form of this species to be described.

*Cinara hottesi* (Gillette and Palmer)

*Apterous male.*

Length from vertex to end of anal plate varying from 1.93-2.35 mm. Head, thorax and abdomen bluish-black without pulverulence. First and second antennal segments blackish, remaining antennal segments dusky yellow with apical portions dusky. Femora yellowish except for extreme apex which is brownish. Tibiae yellowish becoming light dusky near middle, the dusky growing darker towards the apex. Tarsi dusky. Cornicles black. Dorsum of abdomen with four rows of small wax pore plates.

Head and thorax.—Median suture of head very narrow, not much if any darker than head. Length of antennal segments as follows: III .33-.35 mm., IV .16-.185 mm., V .21-.23 mm., .10-.13 + .42-.057 mm. Secondary sensoria conspicuously few for a male Aphid. Third antennal segment with neither secondary or primary sensoria. Fourth antennal segment with from zero to four secondary sensoria, as a rule none or one. Primary sensorium present on fourth. Fifth antennal segment with from one to three secondary sensoria, as a rule only one, primary sensorium present. Hair on antennal segments, sparse, upstanding about .085 mm. in length. Rostrum longer than the body, the third, fourth and fifth segments extending beyond the abdomen. Last three segments of the rostrum with the following lengths: .26, .18, .085 mm. Hind tibiae varying from 1.43-1.50 mm. in length. Hind tarsal segments with the following lengths: .071-.085 mm., .228-.26 mm. Hair on outer margin of hind tibiae much longer than that on inner margin, also more spine-like, about .1 mm. in length and rather upstanding, forming an angle of about sixty degrees, or more. First tarsal segment with about nine hairs on apical ventral half of segment. Abdomen.—Cornicles about .286 mm. across. Harpagoes black, united for almost all of their length.

*Oviparous female.*

Length varying from 2.71-2.84 mm. Color as in apterous viviparous female. Entire body free from all traces of pulverulence. Length of

antennal segments as follows: III .43-.46 mm., IV .185-.228 mm., V .21-.24 mm., VI .11-.14 + .057 mm. Secondary sensoria distributed as follows: III with neither primary or secondary sensoria, IV as a rule with neither primary or secondary sensoria, but primary sensorium may be present. V with primary sensorium, as a rule without secondary sensoria, but one may be present. Rostrum as long as or longer than body. Thorax and abdomen.—Legs less yellow than in viviparous females, more like those of male. Hind tibiae varying from 1.73-1.93 mm. Hind tibiae most unusual, as a rule without sensoria rarely with one, never with more than three.

Allotype apterous male, taken Oct. 5, 1954 on *Picea engelmannii*, Glade Park, Colorado. Morphotype Oviparous female, taken Sept. 21, 1954 on *Picea engelmannii*, Glade Park, Colorado. Both types deposited in the collection of the United States National Museum.

This must be a rare species. I collected the original material in 1923, this is the second time I have taken it, after years of searching. No one that has seen living specimens of this species will ever take it for anything else. *Picea engelmannii* is fairly common on the Fruita Reserve and southward on the Pinon Mesa, south of Glade Park, Colorado. Strangely enough, I found it on only one limb of a tree, despite the fact that I looked for it on hundreds of trees. On this limb, which was about three feet from the ground, and about two inches in diameter, the specimens were very abundant throughout the season. The colony encrusted on the bark of the limb almost solidly for as long as I could reach. The males in nature greatly resemble immature females, and are therefore very difficult to differentiate from them. I solved this problem by taking large numbers of females, and sorting the males from them under a microscope, even then I took only four males, in three trips after them. The oviparous females were very abundant, and developed through a long period of time starting in mid-September.

#### *Cinara pilicornis* (Hartig)

Prof. Palmer has kindly sent me for study several metatype slides of *C. piceicola* (Cholodkovsky). The material sent by Cholodkovsky was apparently sent in alcohol, and was mounted by L. C. Bragg. It is as I had suspected similar to *C. pilicornis* (H). The drawing of the sixth antennal segment of the apterous viviparous female is not correct as to hairs, in "Aphids of the Rocky Mountain Region." Prof. Palmer has further indicated to me that this drawing was not made from metatype material, as indicated on page 39 of her book. Dr. Pašek of Czechoslovakia, whose work in this group gave great promise, died last summer. He considered a much different species from *pilicornis* as *piceicola*. I suspect that the *piceicola* of Pašek is new, it differs greatly from *pilicornis* (H) and I would not expect Cholodkovsky to confuse the two, even if the material was not mounted. For the time being, we on this side of the Iron Curtain have no way of knowing just what species Cholodkovsky had, nor can we find out if his type material exists. His original description is inadequate, and hardly sufficient to distinguish *piceicola* from *hyalinus* Koch = *pilicornis*. It should also be noted that Cholodkovsky distinguished *hyalinus* from *piceicola* Kalténbach, both species of which are synonyms of *pilicornis*. It is however significant that

Cholodkovsky mentions the male of *piceicola* as apterous, the male of *pilicornis* is said to be alate. He also mentions the fact that the sexual forms appear at the end of June or early July, but these continue to be found till mid-September, when the sexuals of *pilicornis* appear. As has been indicated elsewhere *C. fornacula* Hottes is a closely allied form.

*Cinara obscura* Bradley.

*Cinara enigma* H&K New Synonymy.

Dr. Bradley did not describe the sixth antennal segment of *C. obscura*, which is the most distinctive feature of this species, the unguis being very short and thick. His figure of this segment is not correct, the unguis being shown too long and slender. Since calling this to the attention of Dr. Bradley, he has provided me with a drawing which leaves no doubt that *enigma* is a synonym of *obscura* which has priority by a few months.



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A NEW POCKET GOPHER FROM SOUTH-CENTRAL  
UTAH

BY STEPHEN D. DURRANT

Durrant (Mammals of Utah, Taxonomy and Distribution, Univ. Kansas Publs. Mus. Nat. Hist., 1952) referred pocket gophers from extreme south-central Utah to *Thomomys bottae absonus*. At that time, he had but five specimens from that area of the state. Intensive collecting of mammals has been carried out during the past two summers, and specimens of *Thomomys bottae* were obtained from Garfield County, Utah, from a locality from which no specimens have been taken previously. Critical study indicates that these pocket gophers from Garfield County, Utah, belong to an heretofore unnamed kind.

The writer is indebted to Doctor John Aldrich, and Miss Viola S. Schantz, U. S. Fish and Wildlife Service, U. S. National Museum, Washington, D. C., for the loan of comparative materials. Capitalized color terms are after Ridgway (Color Standards and Color Nomenclature, Washington, 1912).

This research was carried out in part under a grant from the National Science Foundation.

*Thomomys bottae powelli* new subspecies

*Type*.—Adult female, skin and skull, number 7955, Museum of Zoology, University of Utah, Hall Ranch, Salt Gulch, 8 miles west of Boulder, 6,000 feet, Garfield County, Utah, collected by Stephen D. Durrant, August 7, 1951, original number 2578.

*Range*.—Known only from the type locality and immediate environs.

*Diagnosis*.—Size large (see measurements). *Color*: Upper parts and sides uniformly clear Cinnamon-Buff; top of nose with admixture of dark brown hairs; postauricular spots small and dark brown, underparts Pinkish Buff; chin, throat, perineal region, front feet, hind feet and distal ends of forearms and shanks, white. *Skull*: Large, robust; zygomatic arches heavy and widely spreading; widest posteriorly; nasals wide posteriorly, truncate and relatively short as compared with basilar length; extension of premaxillae posterior to nasals long; interpterygoid fossa short and widely V-shaped; pterygoid hamulae robust; upper incisors long and wide.

*Measurements*.—The measurements of two adult male topotypes, numbers 8981 and 9718, and the average and extreme measurements of 4 adult female topotypes (including the type) are, respectively, as follows: Total length, 233, 247, 226 (232-222); length of tail, 70, 70, 70

(76-65); length of hind foot, 32, 35, 32 (33-31); length of ear, 6, 6, 5.25 (6-5); basilar length, 35.6, 38.2, 34.4 (34.8-34.0); length of nasals, 12.2, 14.1, 12.85 (13.0-12.7); zygomatic breadth, 24.5, 26.1, 23.85 (24.7-23.5); mastoid breadth, 20.4, 21.5, 20.2 (20.8-19.7); interorbital breadth, 6.7, 6.5, 6.7 (6.8-6.5); alveolar length of upper molariform teeth, 8.0, 8.1, 7.9 (8.1-7.5); extension of premaxillae posterior to nasals, 3.2, 3.3, 3.4 (4.0-3.0); length of rostrum, 16.1, 17.3, 16.1 (16.5-15.6); breadth of rostrum, 8.0, 8.8, 7.9 (8.2-7.7).

*Comparisons.*—Topotypes of *T. b. powelli* differ from topotypes and near topotypes of *T. b. absonus* as follows: *Color*: Lighter throughout. *Skull*: Interparietal smaller and more triangular in shape; nasals markedly wider posteriorly, and more expanded anteriorly; extension of premaxillae posterior to nasals greater; interpterygoid fossa shorter and more widely V-shaped; cavities at posterior end of palate shallower; pterygoid hamulae heavier; palate wider; upper incisors markedly longer and wider.

Compared with topotypes and near topotypes of *T. b. osgoodi*, topotypes of *T. b. powelli* differ in: *Size*: Larger in nearly all measurements. *Color*: Darker throughout. *Skull*: Interparietal smaller; nasals shorter and wider posteriorly; posterior ends of nasals truncate as opposed to V-shaped; extension of premaxillae posterior to nasals greater; nasals flatter and more expanded distally; interpterygoid fossa shorter and more sharply V-shaped; cavities at posterior end of palate shallower; upper incisors longer and wider.

Topotypes of *T. b. powelli* differ from those of *T. b. dissimilis* in larger size, lighter color, larger, more massive skull, wider posterior ends of nasals, greater extension of premaxillae posterior to nasals and longer and wider upper incisors.

Among named subspecies, topotypes of *T. b. powelli* resemble those of *T. b. planirostris* the closest, but differ from them as follows: *Color*: Lighter throughout. *Skull*: Rostrum narrower; frontal processes of premaxillae narrower; nasals shorter, and wider posteriorly; posterior ends of nasals square as opposed to V-shaped; interparietal smaller and triangular as opposed to subquadrangular; pterygoid hamulae broader; cavities at posterior ends of palate smaller and shallow as opposed to deep.

Compared with topotypes of *T. b. trumbullensis*, topotypes of *T. b. powelli* differ in: *Size*: Larger in nearly all measurements. *Color*: Markedly lighter throughout. *Skull*: Larger, rostrum narrower; posterior ends of nasals wider; maxillary tongues of approximately the same length, but narrower; pterygoid hamulae shorter; interpterygoid space more widely V-shaped; cavities at posterior end of palate markedly shallower; tympanic bullae larger.

*Remarks.*—The range of *T. b. powelli* is quite isolated from that of other subspecies of *T. bottae*. Animals of this particular subspecies appear to be intruders who have taken over a range along a stream in the southern flank of the Aquarius Plateau. This range is surrounded on three sides by pocket gophers belonging to another species, *Thomomys talpoides*.

Reference to the literature will inform the reader that in south-central and southwestern Utah, there are several subspecies of pocket



gophers of the species *Thomomys bottae*. South of the range of *T. b. powelli*, in Arizona, *T. b. absonus* occurs; to the southwest in Arizona, *T. b. trumbullensis* occurs; to the west in Utah, *T. b. planirostris* occurs; to the northeast in the Henry Mountains, *T. b. dissimilis* occurs; and to the north, in the drainage of the Dirty Devil River, *T. b. osgoodi* occurs. All of these subspecies form a complex and show considerable relationship. All of them have relatively small isolated or nearly isolated ranges. Unquestionably, there is some small exchange of genes between animals of these subspecies. Here, then, is demonstrated the amount of genetic fixation that has taken place in these small populations, under semi-isolation. Also, something of the tempo as well as the mode of fixation is indicated, because none of these heretofore mentioned subspecies are considered to be older than extremely late Pleistocene.

These small, microgeographic populations are referred to as subspecies because they are distinct from other populations, have attained a position of comparative genetic stability, and merit some meaningful method of distinction from the general pattern of variation of the species. Moreover, designating them as subspecies, is the more precise, scientific manner to document their degree of advance.

*Specimens examined*.—15, from the type locality.

*Contribution from the Museum of Zoology, University of Utah, Salt Lake City, Utah.*



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TWO NEW RICE RATS (GENUS *ORYZOMYS*) FROM  
FLORIDA

BY W. J. HAMILTON, JR., *Cornell University*

Among a series of small mammals collected in Lee County, Florida during the late winter and early spring of 1954, 26 *Oryzomys* were taken on Pine and Sanibel Island. The specimens from both of these islands are markedly distinct, both in color, in size and skull characters, from *Oryzomys palustris natator* and *Oryzomys palustris coloratus* and may be considered subspecifically distinct.

***Oryzomys palustris planirostris*, new subspecies**

*Type*.—Adult female, skin and skull, number 8090, Cornell University Mammal Collection, collected one mile west of third bridge that spans Matachla Pass, Pine Island, Lee County, Florida, by W. J. Hamilton, Jr., March 11, 1954; original number 4344. The type has the following measurements: Total length, 240; tail vertebrae, 122; hind foot, 32; weight 50.5 grams. Skull: condylobasal length, 30.0; zygomatic breadth, 15.5; cranial breadth, 13.7; nasals, 12.0; interorbital breadth, 5.8; anterior palatine foramen, 6.7; palatal bridge, 6.0; upper molar series, 4.7.

*Range*.—Known only from Pine Island and an area two miles north of Fort Myers, Florida.

*Diagnosis*.—Size small (Table 1). Winter pelage, upperparts brownish gray, top of head and mid-dorsum darker with slightly buffy suffusion on sides and flanks, the buff color scarcely marked in some individuals; underparts dull white; feet white, tail dark gray above, whitish below. Color similar to Georgia and Virginia specimens of *O. p. palustris*, but with a browner caste. Skull small and weak, the supraorbital and temporal ridges much less pronounced than in *natator* or *coloratus*; rostrum relatively short and broad; anterior dorsal profile of skull straight, the nasals and frontals aligned, contrasting to the convex profile of *natator* and *coloratus*.

*Comparisons*.—*Oryzomys palustris planirostris* most nearly approximates in color and size *Oryzomys p. palustris*. It differs from both *natator* and *coloratus* in smaller size, lack of tawny coloration and the smaller and weaker skull characters.

*Remarks*.—Twelve specimens were collected in a garbage dump and adjoining wet land (about five feet above tide level, at the type locality). In company with *Sigmodon hispidus insulicola*, these animals were utilizing the cover formed by tin cans, cardboard cartons and other detritus. Traps placed in well marked runways took both species, as did those set in dense stands of *Spartina patens* well removed from the

TABLE 1

Average and extreme measurements in millimeters of rice rats, *Oryzomys palustris*, from Florida

| <i>O. p. planirostris</i><br>14 skins and<br>12 skulls |       | <i>O. p. sanibeli</i><br>11 skins and skulls |       | <i>O. p. notator</i><br>10 skins and skulls |       | <i>O. p. coloratus</i><br>11 skins and skulls |       |
|--------------------------------------------------------|-------|----------------------------------------------|-------|---------------------------------------------|-------|-----------------------------------------------|-------|
| Ave.                                                   | Max.  | Ave.                                         | Max.  | Ave.                                        | Max.  | Ave.                                          | Max.  |
| 247.5                                                  | 266.0 | 257.5                                        | 274.0 | 281.2                                       | 318.0 | 283.0                                         | 326.0 |
| 119.6                                                  | 128.0 | 123.6                                        | 138.0 | 140.6                                       | 173.0 | 143.5                                         | 171.0 |
| 31.0                                                   | 33.0  | 31.0                                         | 33.0  | 32.1                                        | 37.0  | 33.4                                          | 38.0  |
| 29.3                                                   | 30.8  | 31.4                                         | 32.5  | 32.9                                        | 34.8  | 32.7                                          | 34.8  |
| 15.8                                                   | 16.5  | 16.1                                         | 17.4  | 17.2                                        | 18.8  | 17.1                                          | 19.0  |
| 13.4                                                   | 14.4  | 13.4                                         | 13.8  | 13.6                                        | 14.0  | 13.8                                          | 14.5  |
| 11.2                                                   | 12.0  | 11.7                                         | 13.0  | 12.8                                        | 14.0  | 12.4                                          | 14.0  |
| 5.5                                                    | 5.9   | 5.4                                          | 5.8   | 5.8                                         | 6.2   | 5.7                                           | 6.3   |
| 6.4                                                    | 7.0   | 7.0                                          | 7.4   | 7.2                                         | 7.8   | 7.2                                           | 8.0   |
| 5.8                                                    | 6.0   | 5.3                                          | 5.9   | 6.1                                         | 6.6   | 6.2                                           | 7.0   |
| 4.8                                                    | 4.9   | 4.5                                          | 4.9   | 5.1                                         | 5.3   | 5.2                                           | 7.0   |
| 4.6                                                    |       |                                              |       |                                             |       |                                               |       |

dump. The rice rats were feeding on the stems of *Spartina*, a dropseed grass, *Sporobolus virginicus* and the succulent stems of *Sesuvium portulacastrum*. This series was taken on March 2, 3 and 11, 1954. None of the females were gravid or nursing, although one individual had enlarged testes and turgid uterine horns. The males had enlarged and descended testes, these measuring 9 x 5 to 13 x 7 mm. respectively. All the Pine Island specimens were taken at the type locality. Trapping in the environs of Bokeelia and St. James City produced cotton rats but no rice rats. A large male taken on March 20, 1954, two miles north of Fort Myers in a drainage ditch does not differ from those collected on Pine Island.

*Florida Specimens Examined.*—*Oryzomys palustris planirostris*: Pine Island, 13; two miles north of Fort Myers, 1. *Oryzomys palustris natator*: Lake Harney, 5; Chassahowitska River, 1; Ocala National Forest, 1; Crescent Lake, 1; Geneva, 1; Lake Kissimmee, 1. *Oryzomys palustris coloratus*: Cape Sable (topotypes) 9; Eden, 1; 15 miles northwest of Miami, 1.

#### *Oryzomys palustris sanibeli*, new subspecies

*Type.*—Adult male, skin and skull, number 8192, Cornell University Mammal Collection, collected in freshwater marsh, four miles west of lighthouse on Sanibel Island, Lee County, Florida, by W. J. Hamilton, Jr., April 1, 1954; original number 4446. The type has the following measurements: total length, 263; tail, 125; hind foot, 33; weight, 71 grams. Skull: condylobasal length, 31.9; zygomatic breadth, 16.7; cranial breadth, 13.8; nasals, 11.8; interorbital breadth, 5.4; anterior palatine foramen, 6.8; palatal bridge, 5.9; upper molar series, 4.9.

*Range.*—Known only from Sanibel Island.

*Diagnosis.*—Size small (Table 1). Winter pelage, upperparts between amber brown and argus brown of Ridgway, the brownish color most pronounced on mid-dorsum. Dorsum of summer pelage similar to *Oryzomys palustris planirostris*, but with less gray. Underparts similar to *planirostris*. Skull like *planirostris* but larger, the nasals relatively longer; palatal foramen borders longer and less flaring than in *planirostris*. This insular race differs from *planirostris* primarily in the bright brown winter pelage.

*Comparisons.*—The Sanibel Island specimens are similar in winter pelage to *Oryzomys palustris natator* and *Oryzomys palustris coloratus*, chief difference being in the brighter dorsal pelage and the markedly smaller size, both in body measurements and skull. From winter specimens of *planirostris*, *sanibeli* may be at once recognized by the brown pelage, which contrasts with the general gray tone of the former.

*Remarks.*—The rice rats on Sanibel Island appear to be concentrated in the fresh water swamps provided by artesian wells; single specimens were taken in a swale behind the only school house on the island and in a cattail stand adjoining the south beach road. In the swamp area where specimens were collected, the dominant vegetation consists of cattails. All specimens were trapped near the water's edge; on the drier ground the cotton rat, *Sigmodon hispidus insullicola* was abundant. In this area, the two animals do not appear to cross the local ranges of each other. A noticeable stickiness was noted on the plantar surface

of the hind foot in all *Oryzomys* collected on Sanibel Island, in contrast to fresh specimens I have handled elsewhere. Goldman (N. A. Fauna 43, 1918) states that the new coat of *Oryzomys* seems to replace the old almost imperceptibly, but that adults in apparently fresh and in obviously worn pelages may often be seen together. The rice rats from Sanibel are in several stages of molt, the line of demarcation and the pronounced color difference in winter and summer pelage being well marked. Molt commences on the head and proceeds caudad. This pelage change demonstrates the marked seasonal color variation and the lack of such in other races of *palustris* from southeastern United States.

A collection of 300 barn owl pellets from a former boat loading shed in Tarpon Bay, Sanibel Island, produced many *Sigmodon* skulls and bones, but not a single *Oryzomys*. This may indicate the restricted or spotty distribution of rice rats on Sanibel.

*Specimens Examined*.—Same as for *planirostris*.

For the loan of specimens, acknowledgment is made to Viola S. Sebantz of the U. S. Fish and Wildlife Service. Paratypes of *planirostris* and *sanibeli* have been deposited in the U. S. National Museum.



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NEW RECORDS AND DESCRIPTIONS OF  
CALIFORNIAN DIPLOPODA

BY NELL B. CAUSEY, *Fayetteville, Arkansas*

I am indebted to Mr. Joe E. Gorman for most of the millipeds reported on in this paper. With but two exceptions, which are indicated, they were among the invertebrate associates that he collected during his study of the ecology of the salamander genus *Hydromantes*. Most are from the Sierra Nevada Mountains of California. Holotypes will be deposited in the permanent collection of the American Museum of Natural History. The remaining specimens are in the collection of the author.

Superorder Colobognatha

Order Polyzoniida

Family Polyzoniidae

*Bdellozonium sequoium* Chamberlin

*Bdellozonium sequoium* Chamberlin, 1941, Bull. Univ. Utah, biol. ser., vol. 6, no. 3, p. 5 (female, Hammond, Tulare Co., Calif.).

Records: *Mariposa Co.*: Yosemite National Park, Vernal Falls, May 30, 1953, one female, 48 segments. Hidden Meadow, April 17, 1954, several specimens, the largest a male of 52 segments, width 3.3 mm.

Order Platydesmida

Family Andrognathidae

*Brachycybe producta* Loomis

*Brachycybe producta* Loomis, 1936, Proc. U. S. Natl. Mus., vol. 83, no. 2989, pp. 367-368, fig. 32, h, i (male, ? central mountainous portion of lower California).

Record: *Mariposa Co.*: Yosemite National Park, Vernal Falls, May 30, 1953, one female, 76 segments.

*Eucybe clarus* Chamberlin

*Eucybe clarus* Chamberlin, 1941, Bull. Univ. Utah, biol. ser., vol. 6, no. 4, p. 3 (female, Hastings Reservation, Monterey Co., California).

Record: *Tulare Co.*: Silliman Gap Trail, Redwood Canyon, Sequoia National Park, May 16, 1953, fragment of one male.

Superorder Eugnatha

Order Spirobolida

Family Spirobolidae

*Californibolus uncigerus* (Wood)

*Spirobolus uncigerus* Wood, 1864, Proc. Acad. Nat. Sci. Philadelphia,

vol. 15, p. 15 (male, California); 1865, Trans. Amer. Philos. Soc., vol. 13, p. 209, fig. 36.

*Tylobolus uncigerus*, Cook, 1904, Harriman Alaska Exped., vol. 8, no. 1, p. 67.

*Californibolus uncigerus*, Chamberlin, 1949, Jour. Washington Acad. Sci., vol. 39, no. 5, p. 166.

Records: *Shasta Co.*: Low Pass Creek, April 1, 1953, two males; March 25, 1951, one female, width 8.7 mm., 49 segments. Round Mountain, April 1, 1953, one male, width 7 mm., 52 segments.

The color is variable. Usually the midbelts are bright red-brown, but they may be gray; the hindbelts vary from bright brown to very dark brown. The distribution of prickles on the cephalic surface of the last article of the posterior gonopods is as in *C. rectus* Chamberlin, 1949. Other details of the gonopods correspond to Wood's figure.

*Californibolus pontis* Chamberlin

*Californibolus pontis* Chamberlin, 1949, *ibid.*, vol. 39, no. 5, p. 166, figs. 18, 19 (male, Bridgeville, Humboldt Co., California).

Record: *Shasta Co.*: Low Pass Creek, April 14, 1952, one male, width 4.7 mm., 52 segments.

*Auxobolus ergus* Chamberlin

*Auxobolus ergus* Chamberlin, 1949, *ibid.*, vol. 39, no. 5, p. 163, figs. 5-7 (male, Tollhouse, Fresno Co., California).

Record: *Mariposa Co.*: Trail between Vernal Falls and Happy Isles, Yosemite National Park, Feb. 27, 1954, one male, width 7 mm., 56 segments.

Several females and larvae collected at Briceburg, Mariposa Co., November 13, 1952, January 3, 1953, and February 26, 1954, have been tentatively assigned to this species.

Order Julida

Family Paraiulidae

*Spathiulus elegantulus* Causey

*Spathiulus elegantulus* Causey, 1950, Proc. Ark. Acad. Sci., vol. 3, pp. 47-48, figs. 18-21 (male, Happy Isles, Yosemite National Park, California).

Record: *Mariposa Co.*: Trail between Vernal Falls and Happy Isles, Yosemite National Park, Feb. 27, 1954, one male, 53 segments, 3 legless, light brown.

? *Bollmaniulus*

Records: *Mariposa Co.*: Trail between Vernal Falls and Happy Isles, Yosemite National Park, Feb. 27, 1954, one larva. *Shasta Co.*: Madison Creek, Sept. 2, 1951, one female, width 4.3 mm., several larvae.

Family Paeromopidae

*Paeromopus cavicolens* Chamberlin

Figure 1

*Paeromopus cavicolens* Chamberlin, 1953, Proc. Biol. Soc. Washington, vol. 66, pp. 68-69, figs. 3, 4 (male, Windeler Cavern, Tuolumne Co., California).

Records: *Mariposa Co.*: Vernal Falls, Yosemite National Park, May 30, 1953, one female, width 5.8 mm., 71 segments. Briceburg, Feb. 26, 1954, one female, width 5.8 mm.; several larvae. *Shasta Co.*: Low Pass Creek, Jan. 29, 1953, one female, width 6.4 mm.; March 25, 1952, one female, width 7.4 mm., 72 segments; April 1953, one female, width 7.4 mm., 73 segments. Bass Creek, April 1953, one female, width 7.6 mm., 69 segments.

The details of the anterior gonopods of this species are shown in figure 1. The apex of the posterior gonopods is expanded into a small, thin-walled corolla. In specimens from Shasta County there is an orange band on the metazonites that extends as far ventrad as the pores, but in specimens from Mariposa County the dorsal orange bands are almost or completely replaced by the general body color. No significant differences between the gonopods of the specimens from these two counties were observed.

*Atopolus chamberlini* (Brölemann)

Figure 2

*Paeromopus chamberlini* Brölemann, 1922, Ann. Ent. Soc. Amer., vol. 15, no. 4, pp. 289, 298-299, figs. 6-9, 53-57 (male, Mt. Shasta, Siskiyou Co., California).

*Atopolus chamberlini*, Chamberlin, 1949, Nat. Hist. Misc., no. 52, p. 4.

Records: *Shasta Co.*: Low Pass Creek, Jan. 24, 1953, one male, width 4.7 mm.; one female, width 5 mm. Round Mt., April 1953, several larvae.

Mr. Gorman described this species in his field notes as "brown, with a broad, cream, dorsal, longitudinal band." The female has the band the entire length of the body, but in the male it extends only half the length of the body. The minute details of the gonopods differ a little from Brölemann's figures, possibly because he was more interested in the fundamental relationships of this species than in its specific characters. The right anterior gonopod is shown in figure 2.

*Klansolus vicinus* (Chamberlin)

*Californiulus vicinus* Chamberlin, 1943, Bull. Univ. Utah, biol. ser., vol. 8, no. 2, pp. 12-13, figs. 40-42 (male, Dickson Flats, Shasta Co., California).

*Klansolus vicinus* Chamberlin, 1949, Nat. Hist. Misc., no. 52, p. 5.

Record: *Shasta Co.*: Lassen Volcanic National Park, Summit Lake, June 26, 1951, one male, 73 segments, width 4.4 mm. (L. R. and H. W. Levi).

*Klansolus yosemitensis* (Chamberlin)

*Californiulus yosemitensis* Chamberlin, 1941, Bull. Univ. Utah, biol. ser., vol. 6, no. 4, p. 17, pl. 3, figs. 24-26 (male, Aspen Valley, Yosemite National Park, California).

*Klansolus yosemitensis* Chamberlin, 1949, Nat. Hist. Misc., no. 52, p. 5.

Records: *Mariposa Co.*: Yosemite National Park, Vernal Falls, May 30, 1953, two males, one female; Mariposa Grove, May 14, 1879, one female, 70 segments, 6 mm. (Illinois Natural History Survey). *Tulare Co.*: Sequoia National Park, Redwood Canyon, Silliman Gap Trail, May 16, 1953, one female, 68 segments, width 5 mm.

## Order Chordeumida

## Family Caseyidae

*Caseya sequoia* Chamberlin

*Caseya sequoia* Chamberlin, 1941, Bull. Univ. Utah, biol. ser., vol. 6, no. 5, p. 10, pl. 2, figs. 17-18 (female, Sequoia National Park, Tulare Co., California).

Records: *Mariposa Co.*: Briceburg, February 26, 1954, one female.  
*Tuolumne Co.*: Sonora Pass, November 15, 1952, one immature male.

## Family Conotylidae

? *Conotyla*

Record: *Mariposa Co.*: Trail between Vernal Falls and Happy Isles, Yosemite National Park, Feb. 27, 1954, one female, length 11 mm.

## Order Polydesmida

## Family Xystodesmidae

All of the xystodesmids in this collection have the second article of the legs spined and the first article and the adjacent sternum unspined. The following key is based on somatic characters, mostly generic, of specimens of either sex, and it must be supplemented with figures of the male gonopods:

- 1(2). Anterior margin of collum elevated near each antenna. Keels of second segment extend farther laterad and ventrad than do those of either the collum or the third segment.....*Amplacheir reducta*
- 2(1). Anterior margin of collum not elevated at any point. Keels of second segment not conspicuously wider or lower than those of the collum or of the third segment..... 3
- 3(8). Keels of second, third, and sometimes the fourth, segments directed slightly cephalad; anterior angle of these keels square and often bearing a single small tooth ..... 4
- 4(5). Keels of middle body segments quadrangular.....*Harpaphe pottera*
- 5(4). Keels of middle body segments triangular ..... 6
- 6(7). Anterior margin of collum forms an uninterrupted convex curve .....*Hybaphe tersa*
- 7(6). Anterior margin of collum convexly curved, but interrupted near each antenna by a very shallow depression.....? *Paimokia*
- 8(3). Keels of second, third, and fourth segments directed laterad; anterior angles of these keels rounded, never bearing an obscure tooth ..... 9
- 9(10). Metazonites of last few segments with several irregular rows of tubercles .....*Xystocheir cooki*
- 10(9). Metazonites of last few segments with faint traces of a single row of tubercles on the margin.....*Delocheir conservata*

*Harpaphe pottera* Chamberlin

*Harpaphe pottera* Chamberlin, 1949, Proc. Biol. Soc. Washington, vol. 63, p. 129, fig. 10 (male, Potter Creek, Mendocino Co., California).

Records: *Shasta Co.*: Brock Mt., April 16, 1952, one male, one female.  
Low Pass Creek, March 25, 1951, one female; January 21, 1952, one male.  
Madison Creek, September 2, 1951, two males, widths 6.6 and 6 mm.

*Hybaphe tersa* Cook

*Hybaphe tersa* Cook, 1904, Harriman Alaska Exped., vol. 8, no. 1, p. 58 (male, Almata, Whitman Co., Washington).

Records: *Shasta Co.*: Low Pass Creek, January 29, 1953, one male, one female; April 1953, one male. Madison Creek, Sept. 2, 1953, two males.

In the only specimens in which the color appears to be fully developed, the metazonites are red-orange and the prozonites are green to brown. The shape of the prefemoral branch of the gonopods is somewhat variable as to width and the apex is either acute or rounded.

*Xystocheir cooki*, new species

Figure 3

*Diagnosis*: All four prongs of the male gonopod are attenuated as in *Xystocheir tularia* Chamberlin 1949, but they are relatively wider and shorter than described for that species.

*Type locality*: Tulare Co., Sequoia National Park, Redwood Canyon, Silliman Gap Trail, May 16, 1953, two males, one female.

*Male holotype*: Width 5.5 mm. Color faded in preservative. Dorsum shining. Beginning sparsely on the second segment and becoming very numerous proceeding caudad, there are small but well defined tubercles on the metazonites, but not on the keels. On segment 16 there are four or five very indefinite rows, with about 20 in each row, while on segments 18 and 19 they are more numerous, but not contiguous. Keels of segments two through four directed laterad; their anterior angle is rounded and the posterior angle is right to a little obtuse. Beginning with the keels of the fifth segment and increasing toward the hind end of the body, the anterior angle is broadly rounded, the posterior angle is produced a little caudad, and the posterior margin is minutely dentate; the lateral margin is either straight or slightly convex. Keels of segment 19 less than half the length and width of keels of segment 18. Dorsum arched. Pores on margin of keels, opening above, and marked by no conspicuous swelling. Anal tergite narrowly produced, the apex truncate. Coxa of the third legs with a sparsely setose, anteriorly directed, finger-like lobe arising from the medial surface; these lobes are about the same thickness and twice the length of the seminal lobes of the second legs. Last two articles and ventral surface of coxae of all legs densely setose; other surfaces of legs sparsely setose. Second article of all legs behind the gonopods spined, the spines long, sharp, and curved on the posterior legs. Coxae and sternum unspined.

Telopodite of gonopods subparallel, not contiguous, all four prongs attenuated, but only the prong carrying the seminal canal is twisted (fig. 3). Shaft of telopodite thickly setose on the dorsal surface; the end of some of the setae reach as high as the base of the lowest prong.

*Female paratype*: Width 6 mm., length 31 mm. Dorsum a little higher and keels a little narrower than in the male, but the shape of the keels and the distribution of tubercles are as in the male. Coxa of second legs with a stiff, finger-like, ventrally directed process arising from the medio-distal margin. Second article of legs behind the tenth spined as in the male. Below the spine the legs are glabrous; beyond the spine they are sparsely setose, except the tarsus, which is thickly setose.

It is a pleasure to name this species for the late Dr. O. F. Cook.



*? Paimokia*

Record: *Mariposa Co.*: Briceburg, 0.6 to 0.7 mile northeast, Nov. 15, 1952, one male of 19 segments.

***Amplocheir reducta*, new species**

## Figure 4

*Diagnosis*: Distinguished from *Amplocheir sequoia* (Chamberlin, 1941) by the proximal joint of the male gonopod, which bears, instead of three slender spines, one blunt setose process and a longer, flattened, acute process.

*Type locality*: Mariposa Co., Briceburg, 0.6 to 0.7 mile northeast, Nov. 15, 1952, one male; Feb. 26, 1954, one female.

*Male holotype*: Width 4.2 mm., length about 24 mm. Color faded in preservative. Exoskeleton thin. Dorsum weakly arched, most of the keels horizontal. Beginning sparsely on the third segment and becoming more numerous on the metazonites of the posterior segments, there are low tubercles, each with a punctum on its apex. The tubercles are obsolete and scattered on the anterior half of the body, but on the posterior half they are arranged in three rows; the anterior row is scattered, but the second and third are even and distinct. There are seldom more than 20 tubercles in a row, and they never extend out on the keels. Coxa of third legs with a setose, anteriorly directed process about the length and thickness of the seminal lobe of the second legs. A pair of low mounds on the sternum between the fifth legs. All coxae very setose ventrad; other articles of the legs sparsely setose, except the tarsal, which is thickly setose. Sternum glabrous. Coxae and sternum unspined. Second article of all legs behind the gonopods spined.

Anterior margin of collum elevated noticeably near each antenna. Keels of collum widely rounded, for the family. Keels of segments two through four directed laterad; their anterior angle is rounded and the posterior angle is rounded-obtuse. Keels of second segment extend farther laterad and ventrad than the keels of either the collum or of the third segment, thus resembling the Strongylosomidae. On segments five through 15 the keels are acute and slightly hooked; behind 15 the caudal angle becomes increasingly less acute. Cephalic and lateral margins of keels form a wide, even curve; caudal margins very finely granulated. Keels of segment 19 about two-thirds as wide and long as those of segment 18. Anal tergite narrowly produced, the apex truncate; apical half depressed. Pores on margin of keels, opening above in a slight swelling.

Telopodites of gonopods subparallel *in situ*, with the mesial processes of the proximal segment crossing. The telopodite ends in two long, curved, aciculiiform processes; the proximal segment bears only one process (fig. 4), thus differing from the generotype, *A. sequoia*, where there are three.

*Female topotype*: Width 5.4 mm. Color incompletely developed, but there are traces of orange on the lateral margin of the keels and of brown on the metazonites. Collum, keels, tuberculation of metazonites, anal tergite, and spination of legs as described for the male. Coxae of second legs with a stiff, finger-like, ventrally directed process arising from the disto-medial margin.



*Delocheir conservata* Chamberlin

*Delocheir conservata* Chamberlin, 1949, Jour. Washington Acad. Sci., vol. 39, no. 3, p. 99, fig. 18 (male, Hastings Reservation, Monterey Co., California).

Record: Mariposa Co.: Briceburg, Feb. 24, 1952, one male, width 5.6 mm.

Family **Sigmocheiridae**, new family

The family Sigmocheiridae is proposed for the genera *Sigmocheir* Chamberlin, 1951, and *Orophe* Chamberlin, 1951, which formerly were included in the family Eurydesmidae. Unexpected and previously unpublished characters in these genera are the rigid fusion of the coxae of the gonopods and the concave anterior margin of the wide collum (fig. 5).

Type genus: *Sigmocheir* Chamberlin, 1951.

The following characters apply to a male of the type genus: exoskeleton smooth and heavy, body moniliform; keels high and wide, most of them horizontal, their corners rounded, produced caudad only on the last two or three segments; middle of metazonites slightly higher than keels; apex of anal tergite narrow, conical; pore formula 5, 7, 9, 10, 12, 13, 15-19; pores open laterad from a longitudinal welt; margins of anal valves compressed, elevated; anal sternum triangular; legs without any special enlargements or spines; legs and antennae relatively longer than in the Xystodesmidae; sterna of last four or five diplosomites with a small spine adjacent to each coxa; gonopodal opening transversely oval. Coxae of gonopods rigidly fused along a short medial suture; coxae also connected by a thick, transverse muscle dorsal to the suture; coxal horns present on the mesial distal surface of the coxae, just beyond the suture; telopodites simple, directed cephalad, the tibio-tarsal region set off by a suture.

The Sigmocheiridae resemble the Mexican and Central American family Rhachodesmidae, and if the gonopods did not lack a coxal horn in that family the two groups might be put together. Somatically the Sigmocheiridae are very unlike any of the several other families in which the gonopods are coalesced; they undoubtedly represent an independent and rather recent development of that character. The range, Montana and California, overlaps that of the family Xystodesmidae, from which they are easily distinguished by the moniliform appearance, the high keels, the absence of spines on the second article of the legs, and the medial fusion of the gonopodal coxae.

*Sigmocheir calaveras*, Chamberlin

Figure 5

*Sigmocheir calaveras* Chamberlin, 1951, Nat. Hist. Misc., no. 87, pp. 5-6, figs. 10, 11.

Records: Calaveras Co.: Wool Hollow, April 10, 1952, one male, width 7 mm. Mariposa Co.: Briceburg, Feb. 24, 1952, one male, width 7.4 mm.; trail between Vernal Falls and Happy Isles, Yosemite National Park, Feb. 27, 1954, one female of 19 segments, width 5.5 mm.

When the color is fully developed the keels are bright yellow, remainder of dorsum except for large, medial, ovoid, yellow areas on the metazonites are yellow; legs lighter yellow.

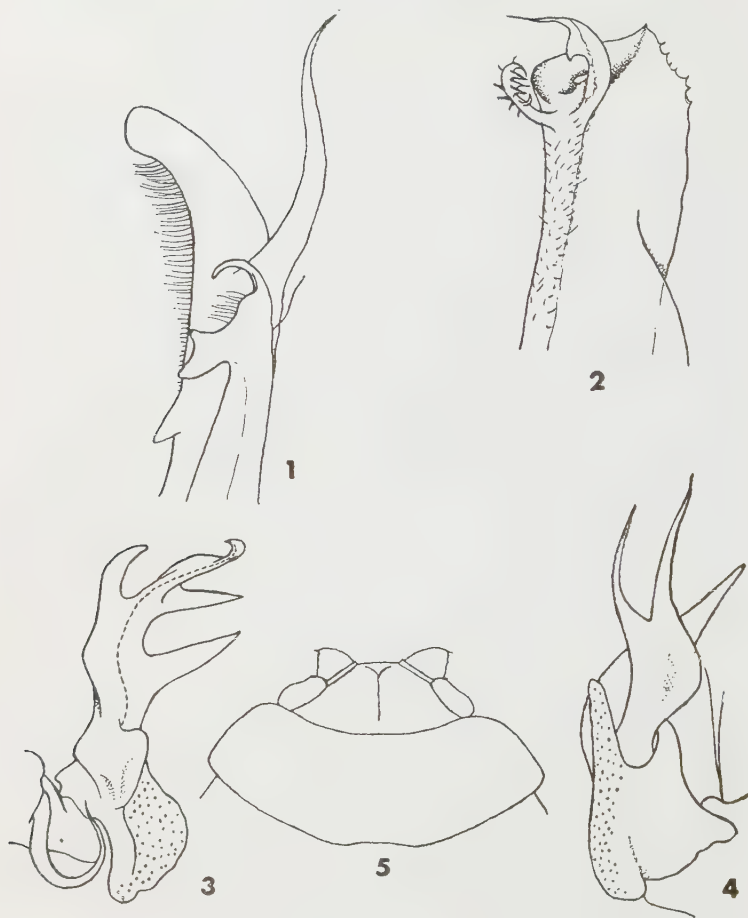


Fig. 1. *Paeromopus cavicolens*. Left anterior gonopod, cephalic surface.

Fig. 2. *Atopoulus chamberlini*. Right posterior gonopod, cephalic surface.

Fig. 3. *Xystocheir cooki*, new species. Left gonopod, subdorsal view, male paratype.

Fig. 4. *Amplocheir reducta*, new species. Left gonopod, subventral view, male holotype.

Fig. 5. *Sigmoecheir calaveras*. Head and collum, dorsal surface.

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A NEW CRAYFISH OF THE GENUS CAMBARUS  
FROM MISSISSIPPI

BY HORTON H. HOBBS, JR.

*Samuel Müller Biological Laboratories, University of Virginia*

The new species described below was collected from four localities in eastern Mississippi in the Pascagoula and Tombigbee drainage systems. In its habits it resembles *Cambarus fodiens* (Cottle, 1863: 217) and *Cambarus uhleri* Faxon (1884: 116), and probably is a secondary burrower (Hobbs, 1942: 20). Most of the specimens were taken in shallow water from among grasses and debris in roadside ditches; however, others were found in sluggish portions of streams and a few were dug from simple burrows less than two feet in depth.

Because of the unusual combination of certain characteristics and the unique chela and first pleopod of the male a new Section of the genus is proposed below to receive this crayfish. (see *Relationships*).

Genus *Cambarus* Erichson, 1846

*Cambarus cristatus*,<sup>1</sup> sp. nov.

Diagnosis.—Rostrum subplane or slightly excavate, ovate, and without lateral spines at base of acumen. Areola 4-7.5 times longer than broad and comprising 31-32 percent of entire length of carapace. Lateral surfaces of carapace devoid of spines or prominent tubercles. Suborbital angle obsolete. Postorbital ridges without spines or tubercles on cephalic extremity. Antennal scale almost one-half as broad as long. Chela with a cristiform row of tubercles on inner margin of broad palm, the upper surface of the latter covered with small ciliated squamous tubercles. First pleopod of first form male with central projection directed at approximately a 65 degree angle to the main shaft of the appendage and the relatively slender mesial process at a 90 degree angle. Annulus ventralis of female movable; see figure 7.

*Holotypic Males, Form I.*—Body subcylindrical. Abdomen narrower than thorax (6.2-7.8 mm. in widest parts respectively). Width of carapace less than depth in region of caudodorsal margin of cervical groove (7.8-8.0 mm.). Areola relatively broad (4.7 times longer than wide), with moderately deep punctations, three across narrowest portion. Cephalic section of carapace 2.1 times as long as areola (length of

<sup>1</sup>L. *crista*—crest. So named because of the cristiform row of tubercles along the inner margin of the palm of the chela.

areola 32.1 percent of entire length of carapace). Rostrum subspatulate in outline with a small up-turned acumen; margins, not swollen and only slightly elevated, diverge for a short distance from base before gently converging toward apex; no lateral spines present. Upper surface subplane, a slight submedian depression in basal half and with minute setiferous punctations. Subrostral ridges poorly developed and visible in dorsal aspect for a short distance at base.

Postorbital ridges, long, well-defined and with dorsolateral longitudinal grooves; cephalic extremities without tubercles or spines. Suborbital angle obsolete. Branchiostegal spine acute and well-defined. No spines or tubercles on side of carapace immediately caudad of cervical groove. Carapace punctate dorsad and weakly granulate laterad. Abdomen longer than carapace (18.1-16.2 mm.). Cephalic section of telson with four spines in the right and three in the left caudolateral corners.

Epistome (fig. 8) broadly triangular with a subplane surface and a small cephalomedian projection. Antennules of the usual form with a prominent spine on the lower surface of basal segment. Antennae extend caudad to fourth abdominal segment. Antennal scale (fig. 3) broader in distal than in proximal half, almost one-half as long as broad; outer thickened portion not so wide as lamellar area and terminating distally in an acute spine.

Chela with broad palm only slightly inflated; upper surface of palmar area with ciliated squamous tubercles and lower with setiferous punctations. Inner margin of palm with a cristiform row of 17 tubercles. All other tubercles on palm distinctly smaller. Fingers not gaping. Upper and lower surfaces of both fingers with a submedian longitudinal ridge flanked by setiferous punctations; ridges on upper surfaces more prominent. Opposable margin of dactyl with a row of three corneous-tipped tubercles along basal half, between and distad of which is a sublinear arrangement of minute denticles; mesial margin with setiferous punctations, the more distal ones of which lie in a longitudinal groove. Opposable margin of immovable finger with three tubercles along proximal half; the distal one lies in a lower plane of the finger than that of the two proximal ones; distad and between these tubercles are minute denticles corresponding in position to those on the dactyl; lateral margin of finger with a row of setiferous punctations.

Carpus of cheliped a little longer than broad, and with a distinct longitudinal furrow above; mesial half of podomere with conspicuous tubercles and lateral half with setiferous punctations. Only two tubercles on podomere conspicuously larger than others—one on mesial surface distad of midlength, and the other at lower, outer distal margin.

Merus of cheliped with upper, mesial, and lower surfaces tuberculate and lateral surface punctate. Although tubercles on lower surface are scattered, an inner row of 17 tubercles and an outer one of nine are moderately well-defined.

Hooks on ischiopodites of third pereopods only; hooks strong and simple. Coxa of fourth pereopod without a conspicuous prominence; a small ventrally projecting triangular one present on fifth.

Sternum at base of coxopodite of third and fourth pereopod with prominent setiferous lobes—more conspicuous than those of most crayfishes.

First pleopod (figs. 1, 5) reaching coxopodite of third pereopod when abdomen is flexed; distal portion terminating in two distinct parts. Central projection corneous, with an acute tip, and bent at an angle of about 65 degrees. Mesial process non-corneous, with distal portion slender and directed at a 90 degree angle to the main shaft of the appendage. Both terminal elements directed caudad.

*Morphotypic Male, Form II.*—Differs from the holotype in the following respects: Upper surface of rostrum more hirsute; punctations in areola not so conspicuous or so abundant; cephalic section of telson with four spines in each caudolateral corner; row of tubercles along inner margin of palm much reduced and scarcely visible; opposable margins of fingers of chelae with very weak tubercles and a single row of minute denticles. Groups of tubercles on proximal podomeres of chelipeds occur in smaller numbers and are reduced in size. The usual differences occur in the secondary sexual characteristics—i.e., hooks on ischiopodites of third pereopods much reduced; central projection of first pleopod noncorneous and blunt, and mesial process subtriangular (figs. 2 and 4); also sternal prominences at bases of third and fourth pereopods less conspicuous. (See measurements.)

*Allotypic Femlae.*—Differs from the holotype in the following respects: Upper surface of rostrum hirsute; cephalic section of telson with three spines in each caudolateral corner; inner margin of palm of chela with a cristiform row of 14 tubercles. Annulus ventralis subovate with the greatest length in the transverse axis. The broadly S-shaped sinus originates near the midcephalic margin of the annulus and passes caudad to its midcaudal margin; surface features are illustrated in figure 7. Sternal plate immediately caudad of annulus ventralis subrectangular in outline.

Measurements.—As follows (in mm.):

|                                | Holotype | Morphotype | Allotype |
|--------------------------------|----------|------------|----------|
| Carapace—                      |          |            |          |
| Height                         | 8.0      | 6.3        | 7.4      |
| Width                          | 7.8      | 6.5        | 8.1      |
| Length                         | 16.2     | 14.2       | 16.8     |
| Areola—                        |          |            |          |
| Width                          | 1.1      | 0.9        | 1.1      |
| Length                         | 5.2      | 4.7        | 5.5      |
| Rostrum—                       |          |            |          |
| Width                          | 3.0      | 2.6        | 3.2      |
| Length                         | 3.5      | 3.4        | 3.8      |
| Chela—                         |          |            |          |
| Length of inner margin of palm | 4.5      | 2.5        | 3.4      |
| Width of palm                  | 4.7      | 2.5        | 4.2      |
| Length of outer margin of hand | 10.3     | 6.7        | 8.7      |
| Length of dactyl               | 5.5      | 4.2        | 5.0      |

*Type Locality.*—Roadside ditch, 11.3 miles south of Macon on Route 45, Noxubee County, Mississippi. Here the animals were collected with a seine pulled through the grass and litter on the clay bottom. In no place was the turbid water more than a foot deep. One or two specimens were dug from simple burrows about one and one-half feet deep. Other



crayfishes taken at the same time were *Procambarus acutissimus* (Girard, 1852:91) and an undescribed species of the latter genus.

*Disposition of Types.*—The holotypic male, form I, allotypic female, and morphotypic male, form II are deposited in the United States National Museum (nos. 96985, 96986, and 96987, respectively). Of the 51 paratypes, one male, form I, one male, form II, and one female are deposited in the Museum of Comparative Zoology and a similar series in the collection of Dr. G. H. Penn. Three males, form I, eight males, form II, 25 females, four juvenile males and five juvenile females are retained in my personal collection at the University of Virginia.

*Variations.*—The areola varies in width from 4-7.5 times longer than broad, with from two to four punctations in narrowest part. In some specimens the punctations are scattered and relatively inconspicuous while in others they are more abundant and prominent. The row of tubercles on the palm of the chela varies from 14 to 18, the males usually having a larger number than the females. Among the minor variations in numbers of spines or tubercles is a range of two to five spines in the posterolateral corners of the cephalic section of the telson. The only suggestion of distinct local variations is seen in the annulus ventralis of the two females from Lauderdale County. In these specimens the sinus, which is not well-defined, is not so sinuous and lies in a longitudinal depression which is more conspicuous than that seen in females from the type locality.

*Relationships.*—*Cambarus cristatus* is not closely related to any described species of the genus. The first pleopod more nearly resembles that of certain members of the Diogenes Section, while the short, broad areola is similar to that of certain members of the Bartonii Section. In its habits, as stated above, it is similar to *Cambarus fodiens* and *C. uhleri*. The shape of the chela and the broad antennal scale are unique, not found in any other members of the genus *Cambarus*. For the reasons stated it seems best to assign *cristatus* to a separate section of the genus, the Cristatus Section.

*Specimens Examined.*—A total of 54 specimens have been examined from the following four localities in Mississippi. *Kemper County*: 4-1954-12c, Backwaters of Scooba Creek, 21.1 miles south of Scooba on U. S. Highway 45, 1 juv. ♂, W. R. West and Hobbs, coll. *Lauderdale County*: 4-1854-3b, Roadside ditch, 5 miles south of Meridian on U. S. Highway 11, 2 ♀♀, Jean E. Pugh, Sam R. Telford, and Hobbs, coll. *Lowndes County*: 4-1454-2c, Small stream, 0.5 miles north of the Noxubee County line on U. S. Highway 45, 1 ♀, 3 juv. ♂♂, 5 juv. ♀♀, J. E. P., S. R. T., and H. H. H. coll. *Noxubee County*: (Type locality) 4-1454-4a, roadside ditch, 11.3 miles south of Macon on U. S. Highway 45, 6 ♂♂ I, 11 ♂♂ II, 25 ♀♀, J. E. P., S. R. T., and H. H. H. coll. All of the specimens were collected from roadside ditches or from sluggish areas of streams. In both situations they were found among grass or in the detritus collected on the bottom, and a few specimens were dug from simple burrows.

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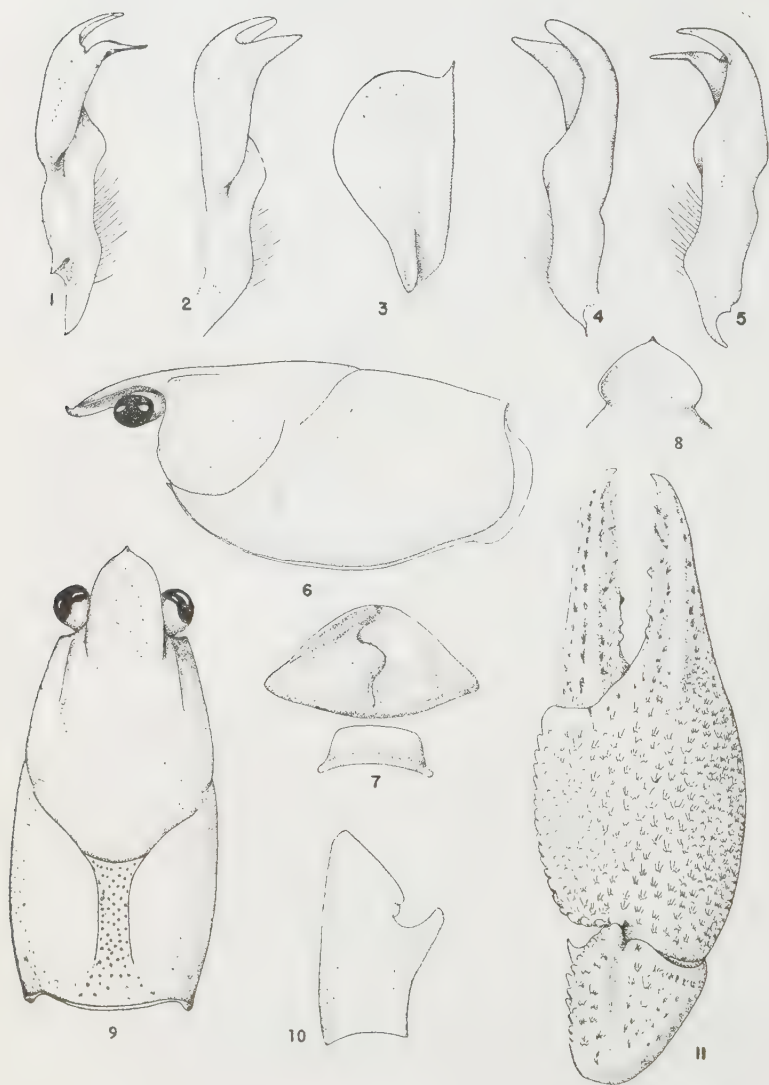


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#### Explanation of Figures

*Cambarus cristatus*, sp. nov.

- Fig. 1—Mesial view of first pleopod of male, form I.
- Fig. 2—Mesial view of first pleopod of male, form II.
- Fig. 3—Antennal scale.
- Fig. 4—Lateral view of first pleopod of male, form II.
- Fig. 5—Lateral view of first pleopod of male, form I.
- Fig. 6—Lateral view of carapace of male, form I.
- Fig. 7—Annulus ventralis of female.
- Fig. 8—Epistome.
- Fig. 9—Dorsal view of carapace of male, form I.
- Fig. 10—Ischiopodite of third pereopod of male, form I.
- Fig. 11—Distal podomeres of cheliped of male, form I.







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THREE NEW SUBSPECIES AND FIGURES OF FIVE  
PREVIOUSLY UNFIGURED SPECIES OF *CINARA*  
(APHIDAE)

BY F. C. HOTTES

Sooner or later every taxonomist comes across specimens which present some variation from the typical forms of described species. Such is the case of the three forms described herewith. Had these forms been observed critically enough when alive, had more material been collected, or had an opportunity to follow the life cycle been afforded, they might have been described as species. For the present it may suffice to describe them briefly as subspecies and call attention to their variations.

*Cinara villosa* (G&P) subspecies *parvavillosa* n. subspecies.

This form which is described as a new subspecies of *C. villosa* differs from typical specimens of that species, in the vastly fewer number of hairs on the abdomen of both the alate and apterous viviparous females, the hairs are not only fewer in number, but are finer and somewhat shorter, than those of the typical form. There are also fewer hairs on the antennae, and the fourth segment of the rostrum is slightly shorter.

Holotype apterous viviparous female, taken on *Pinus flexilis* var *reflexa* June 13, 1954, Summerhaven, Arizona. Morphotype alate viviparous female, George D. Butler, Jr., Summerhaven, Arizona, May 31, 1954. Both types deposited in the United States National Museum.

What has been determined as the typical form of *C. villosa* has been taken in the same region on the same host. The host of *C. villosa* as known from Colorado is *Pinus flexilis*.

*Cinara villosa* (G&P) and *Cinara wahtolca* H. are allied species, in fact, *C. wahtolca* may be keyed with only minor difficulties to *C. villosa* in Palmer's key to the genus *Cinara* in "Aphids of the Rocky Mountain Region." In life the two species are vastly different. *Cinara hirsuta* H&E is also allied to these two species, but *hirsuta* has much longer hair. All three species have similar pigmented spots posterior to the cornicles, but these are less frequent in specimens of *villosa*. Taxonomists who "see" only these, are in for difficulty. *C. hirsuta* will not key to *villosa* in Palmer's key, because of the length of hair. Couplets 17, 18 and 22 are apt to offer difficulties in the keying of some specimens of *wahtolca*. *C. wahtolca* has fewer hair on the tibiae.

*Cinara wahtolca* H. subspecies *curtiwahtolca* n. subspecies.

Apterous viviparous females of this form, in life, apparently are enough similar to the typical form to be taken for it. Mounted speci-

mens differ from the form as described in the character and length of the hairs on the dorsum of the thorax and abdomen, and in the size and height of the pigmented spots from which they arise. The hair on the dorsum are very fine, arise from a pigmented spot which is not elevated and very small. The hairs are hardly longer than the width of the spots from which they arise, but vary some in length, they are fine and may be difficult to differentiate. The larger pigmented spots anterior to the transverse pigmented spots are as a rule free from hair, when free, they show clear area, which correspond to areas from which hairs arise when such are present. Such hairs are always short, but longer than those found on the dorsum which are about .01 mm. long. The hairs present on the pigmented spots are quite thick, and for the most part dull at the end. The hairs on the ventral surface are normal. Specimens of this form differ from typical specimens of *wahtolca* in the length of various parts of the antennae, legs and rostrum, but it is not known how significant these variations are.

Holotype, apterous viviparous female, deposited in the United States National Museum. Host *Pinus edulis*, Grand Canyon National Park, Arizona, June 15, 1954. The specimens were for the most part collected on small trees growing in the angle formed by the main road into the Park, and the road leading to the Park Air Port. *C. wahtolca* was the most common species of *Cinara* found on *Pinus edulis* in Arizona in early June 1954. It was common and present in great numbers on *Pinus monophylla* in Nevada. *Pinus monophylla* is a new host for this species.

***Cinara villosa* (G&P) subspecies *curtivillosa* n. subspecies.**

This new subspecies of *C. villosa* (G&P) differs from the typical form *C. villosa* in having short hairs on the dorsum of the abdomen, in place of hairs of normal length. In this respect it is similar to the subspecies *C. curtivahtolca* described herewith, except for the fact that the hairs are somewhat longer on the average. Most of the hairs are more or less pointed, they appear to be normal, we do not think they have been worn off or perhaps clipped by ants.

Holotype apterous viviparous female. Taken on *Pinus flexilis* var *reflexa*, July 17, 1954. Summerhaven, Arizona. George D. Butler, Jr., Coll. This slide has been deposited in the United States National Museum.

*Cinara juniperivora* (Wilson).

*Cinara difficilis* H&F 1931 new synonymy.

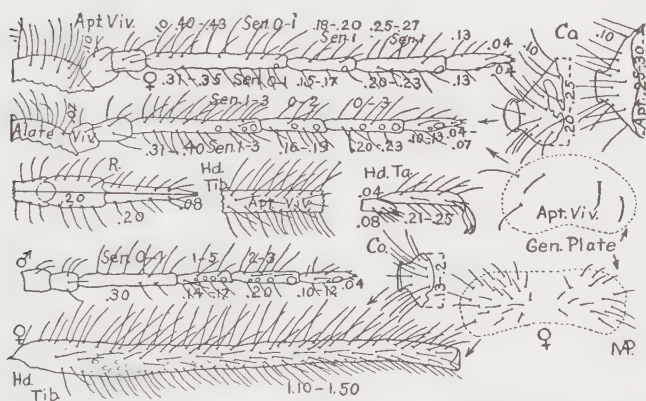
#### *Explanations of Plates*

The descriptions of the forms figured on the plates published herewith, with the exception of the figure of *C. juniperi* (DeGeer) were published in previous volumes of this Journal, either by the writer or the writer and his associates. They have not been figured elsewhere, and none are described in Palmer's "Aphids of the Rocky Mountain Region," either because they were described after this work went to press, or because they are from regions without the limits of this work. The figure of *C. juniperi* (DeGeer) is from a slide now in the collection of Prof. E. O. Essig, which was checked by Dr. Hille Ris Lambers. Records of *C. juniperi* previously published in American literature may be ques-

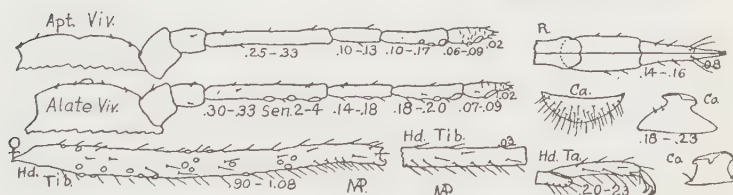


tioned. This species can now be recorded from America, as determined by Dr. D. Hille Ris Lambers.

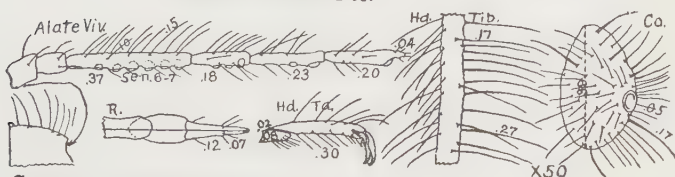
The author is aware that the species figured on the plates published herewith are not associated with the forms described in this paper as new subspecies. He merely takes this opportunity to publish them, for the benefit of other aphid specialists.



*CINARA wahluca* H.



*CINARA wahhaka* H.



*CINARA juniperi* (DeGeer)



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SOME TINGIDAE FROM THE FRENCH CAMEROONS  
(HEMIPTERA)

BY CARL J. DRAKE

This paper is an account of the lacebugs, family Tingidae, netted during an expedition to study the ecology and fauna of the pluvial forests of the French Cameroons, Africa, winter of 1949-1950, by the Universitetets Zoologiske Museum, København. The research investigations and insect collections were made by Dr. Jørgen Burket-Smith (in charge of expedition) and J. Dahl of the above university.

The Tingids, represented by 20 specimens, sort out to two genera and three species. These figures include the species described below as new to science. The specimens, including the type, have been returned to the above museum.

The Tingidae were collected in the pluvial forests and small native "clearings" south of Makak, a small station on the railway between Douala and Yaoundé, about 270 kilometers south of the former city. Field stations were established at "Campement Despierres" (four kilometers south of Makak) and at "Case du Nyong" (12 kilometers south of the first camp) on the southern bank of the river Nyong. At the latter station, a field laboratory was constructed for conducting the ecological studies and making the insect collections. The climate in the region of the stations is that of the calm-belt, a wet tropical one of four seasons.

*Phyllontocheila alberti tricarinata* Schouteden.

*Phyllontocheila alberti tricarinata* Schouteden, Rev. Zool. Bot. Afr. 43(3-4):170.

*Phyllontocheila alberti tricarinata* Drake and Gomez Menor, EOS, Rev. Esp. Ent. 30(1-2):93. (New synonymy)

As the subspecies *P. alberti carinata* Schouteden has priority by a couple of months over the subspecies described by the same name by Drake and Gomez-Menor, the latter is here treated as a synonymy. The description of the subspecies *tricarinata* also makes it necessary to suppress the subgenus *Kotoko* Schouteden as a synonym of the genus *Phyllontocheila* Fieber. (New synonymy)

Fifteen specimens (8 adults and 7 nymphs), both field stations south of Makak, feeding and breeding on the leaves of a small tree, *Veronia* sp. Other specimens have been seen from Spanish Guinea and Belgian Congo. Schouteden also reported *Veronia* as its food plant in the Belgian Congo. The typical form has the pronotum unicarinate instead of tricarinate.

*Phyllontocheila dilatata* (Guérin-Ménéville).

*Tingis dilatata* Guérin-Méneville, Mag. Zool. 1(2):8. tab. 8, 1831.

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*Phyllontochila dilatata* Distant, Ann. So. Afr. Mus. 2:241. 1902.

*Phyllontochila dilatata* Horvath, Ann. Mus. Nat. Hung. 9:328 & 331. 1911.

*Phyllontochila dilatata* Horvath, Kilimandjaro-Meru, 2(12):63.

Four specimens, Case du Nyong, netted in the dense underwood of the forest, along paths and in plantations. Recorded in the literature from Nigeria, Senegal, Rhodesia, Serra Leone, Belgian Congo and French West Africa.

*Tingis nyogana*, n. sp.

Large, rather broad, ovate, testaceous with pronotum largely reddish fuscous and elytra variegated with fuscous and blackish. Length, 4.50 mm; width, 2.60 mm.

Head broad, very short, black, armed above with five, stout, blunt spines; anterior pair and median erect, beadlike, fuscous; hind pair appressed, testaceous, short; eyes large, reddish fuscous. Bucculae broad, closed in front, mostly triseriate, quadriseriate behind. Rostrum brownish testaceous, extending to base of mesonotum; laminate moderately elevated, rather thick, fuscous, divergent anteriorly, apex destroyed by pin. Antennae moderately stout; segment I very stout, very short; II slenderer, nearly the same length as I; III brownish, straight, clothed with extremely short, golden pubescence; IV, short, black, feebly enlarged apically, clothed with pale pubescence; measurements—I, 14; II, 12; III, 90; IV, 28. Orifice with sides of channel strongly elevated, directed upward with apex nearly in contact with hypocoastal laminae. Legs moderately stout, moderately stout, reddish fuscous, clothed with very short, inconspicuous pubescence.

Pronotum quite broad, strongly and broadly convex across humeral angles, very coarsely punctate, moderately roundly narrowed anteriorly, tricarinate; carinae elevated, largely testaceous, composed of one row of fairly distinct areolae; lateral carina united with apex of prostrate hood, reaching to apex of hind pronotal process; lateral carinae terminating anteriorly near base of calli, more widely separated in front of disc, there convex within; hood rather small, pyriform, inflated, feebly produced in front, wider than high, longer than wide; calli large, impunctate, black; paranota long, rather narrow, slightly reflexed, with outer margin slowly rounded, brownish testaceous, uniseriate opposite humeri, wider and biseriate in front; hind process large, testaceous, areolate.

Elytra broad, obovate, brownish testaceous, somewhat variegated with fuscous or blackish markings, jointly broadly rounded behind in repose, widest across apex of hind pronotal process; costal area wide, with a fairly large quadrate black band in front of middle, also with a few scattered small spots and apex black, irregularly tri-quadriseriate; subcostal area subequal to costal in width, quadriseriate in front, triseriate behind, with outer boundary sinuate, acutely angulate at base and apex, extending beyond middle of elytra, widest opposite apex of hind pronotal process; there seven or eight areolae deep; sutural area large, with veinlets largely black, the areolae larger apically. Areolae of elytra rather small and not arranged in very regular rows. Abdomen beneath dark reddish fuscous.

*Type* (female), Case du Nyong, along a path in the cultivated clearings and plantations, Zool. Mus. of Univ. København.

This species may be distinguished from other members of the genus *Tingis* Linneaus (subgenus *Tingis*) by the hood and paranota. The genus *Tingis* and subgenera need further study as a number of species so classified are atypical.





PROCEEDINGS  
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TWO NEW SPECIES OF SHORE-BUGS (HEMIPTERA)  
(SALDIDAE: LEPTOPODIDAE)

BY CARL J. DRAKE

The present paper characterizes two new shore-bugs—one species of the family Saldidae from the Solomon Islands and the other of the family Leptopodidae from Madagascar.

*Pentacora sororia*, n. sp.

Small, obovate, dusky testaceous, rather dull, with the color areas of brown, fuscous or black variable in size, intensity and indefinite in pattern as discussed in description of structures. Length, 3.75 mm. (male) and 4.25 mm. (female); width, 1.62 mm. (male) and 2.12 mm. (female).

Head testaceous with a fuscous or blackish bifid area bearing ocelli, sometimes most of vertex and postocular part blackish; ocelli prominent, separated by less than the diameter of an ocellus. Rostrum long, dark fuscous, shining, extending between hind coxae. Antennae long, slender, testaceous with last two segments dark or blackish fuscous, shortly hairy, with pubescence also on last two segments, measurements—I, 28; II, 62 (male) and 74 (female); III, 42; IV, 42.

Pronotum moderately convergent anteriorly, with outer margins nearly straight; callus large, moderately elevated, with large discal impressions; collar short, narrow, testaceous; hind lobe about one-half as long as callus (10:22), deeply roundly excavated behind, width at base much greater than width of front margin of anterior lobe (115:65), or median length of entire pronotum (115:38). Scutellum very little raised, often mostly black with apex testaceous, the width at base and median length almost equal (74:70). Hemelytra variable in color, flavotestaceous with veins fuscous, or with fuscous and blackish areas that are somewhat variable in size, intensity of color markings and blackish veins; membrane pale in testaceous forms, mostly fuscous in darker forms, divided into five cells. Legs dusky testaceous or whitish testaceous, the femora with some small fuscous spots. Hind legs with tibiae much longer than femora (128:90). Measurements: 80 units equal one millimeter.

*Type* (male) and *allotype* (female), Malaupaina, Three Sisters, Solomon Islands, May 12, 1934, B. A. Lever, British Museum. *Paratypes*: 5 specimens, same data as type.

As *P. sororia* n. sp. is very closely allied to *P. sphacelata* (Uhler) and *P. sonneveldi* Blöte in color, markings and general aspect, the three species are easily confused. *P. sonneveldi* is clothed with distinctly longer pubescent hairs than the other two species. *P. sororia* is smaller,

shorter hind tibiae (128:150) and slightly longer pubescence than *P. sphacelata*. *Sonneveldi* has been reported in the literature from the Celebes and Malay. *P. sphacelata* is widely distributed in North, Central and Insular Americas. It is primarily a tenant of wet sandy and muddy shores near the water's edge of salt and brackish marshes, swamps, tidal flats and ponds of the seacoast (Atlantic, Pacific and Gulf), also of inland salt lakes, springs and wells. Seashores, where high waves break on the beaches and leave heavy pounding surf, make conditions impossible for their existence. Specimens from the light-colored sands of West Indies are usually very pale in color. It has also been taken in Peru.

*Martiniola pulla*, n. sp.

Large, oblong-ovate, black with testaceous and flavotestaceous markings as described with structures. Length, 4.75 mm.; width, 1.95 mm.

Head black, with a median longitudinal furrow in front of ocellar tubercle, with two pairs of erect spines (one on each side of furrow; first pair between eyes and second pair slightly in front of eyes) and three upright spines on top of anterior tubercle testaceous, each side with three extremely long, pale testaceous, laterally-projecting spines, beneath with numerous, white, setalike hairs; ocelli placed obliquely on top of ocellar tubercle, separated by less than the diameter of an ocellus. Rostrum black-fuscous with apex of first segment testaceous, beset with several, long, white, setal hairs; segment I with three extremely long, laterally-directed, pale testaceous spines on each side; II with two much shorter pale spines on each side. Antennae very long, slender, without pubescence, blackish fuscous; segment I short, distinctly flattened, with two or three, short, white spines on each side; II slightly thicker than next two; III and IV quite slender, measurements—I, 21; II, 85; III, 80; IV, 50.

Pronotum rugulose, coarsely punctate, black with five or six small pale spots, beset with numerous, erect or suberect, whitish spinulae or setal hairs; front lobe constricted, much narrower than hind lobe (80:110), shorter than hind lobe (35:45); collar short, narrow, constricted; hind lobe truncate behind, higher and more convex than front lobe, beset with some whitish setal hairs. Scutellum wider at base than median length (60:40), black with apex and a small elevated callus on each side at middle flavotestaceous. Hemelytra blackish, with two subbasal stripes in clavus (one on each side), a submedian stripe in inner corium, and a large subbasal spot, another spot scarcely back of the middle and a divided subapical spot flavotestaceous; embolium moderately wide at base, then narrowed posteriorly, whitish, with outer boundary vein thick, dark fuscous, and armed on exterior margin with a row of moderately long, sharp, whitish spines resting on fuscous bases; membrane dark fuscous, composed of four cells. Thorax beneath blackish with acetabula whitish; venter whitish, with bases of segment fuscous. Elytral spinulae erect or suberect, brownish or fuscous. Hypocostal laminae uniseriate on about basal half, thence narrower and without areolae.

Legs long, slender, with all femora strongly tapering apically, black, the inferior surfaces of all femora and basal part of their dorsal sur-

faces whitish testaceous; all tibiae and all femora with a subapical, flavotestaceous band. Anterior femora armed beneath with six pairs of extremely long, slender, divergent spines (six spines on front and six on hind edge), the three basal pairs black and three apical pairs whitish testaceous; underside of tibiae also armed with six pairs of shorter, black, divergent spines. Middle and hind femora each with a row of very short, whitish spines on hind margin.

*Type* (female), Tamatave, Madagascar, 1949, in Drake Collection.

Separated from its congener *M. madagascarensis* (Martin) by larger size, black color, banded femora and tibiae (subapical) and shorter fourth antennal segment.



PROCEEDINGS  
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SEVEN NEW BIRDS FROM CERRO DE LA NEBLINA,  
TERRITORIO AMAZONAS, VENEZUELA

BY WILLIAM H. PHELPS AND WILLIAM H. PHELPS, JR.

Cerro de la Neblina, the type locality of the birds described in this paper, is located in extreme southern Venezuela near the Brazilian frontier, lat. 1° N, long. 66° W. An ornithological collection was made there by the expedition of the Phelps Collection which joined, at Cerro de la Neblina, a New York Botanical Garden expedition, which had preceded us there, headed by Dr. Bassett Maguire.<sup>1</sup>

Besides the new birds described, we report the first breeding records for Venezuela of four species of *Laridae* and the extension of the range of a tanager from Columbia to Venezuela.

Specimens listed are in the Phelps Collection, Caracas, unless otherwise specified. Names of colors are capitalized when direct comparison has been made with Ridgway's "Color Standards and Color Nomenclature," 1912. Wing measurements are of the chord.

We are indebted to Dr. John T. Zimmer, Chairman of the Department of Birds of the American Museum of Natural History, for access to the collection of that institution.

*Larus atricilla atricilla* Linné

*Larus atricilla* Linné, Syst. Nat., ed. 10, 1, p. 136, 1758. (America-Bahama Islands, *ex* Catesby.)

A nestling collected by us on July 25, 1953, on Isla Sarquí, of Los Roques archipelago, is the first definite breeding record on any of the islands in the Caribbean Sea off the Venezuelan coast, either Venezuelan or Dutch.

Hellmayr records it as breeding south through the Lesser Antilles to the Grenadines. Voous<sup>2</sup> reports it as probably nesting on Klein Curaçao and Bonaire, but this remains to be established definitely.

*Sterna dougallii dougallii* Montagu

*Sterna Dougallii* Montagu, Orn. Dict. Suppl., 1813. (Scotland.)

This species had not been recorded as breeding on the Venezuelan islands of the Caribbean Sea. We found it nesting, with eggs, on June 26, 1954, on Isla Noronquí, of Los Roques archipelago. It is known

<sup>1</sup>Maguire, B. Cerro de la Neblina. A newly discovered sandstone mountain. Geographical Review, New York. XLV, No. 1, pp. 1-26, January, 1955.

<sup>2</sup>Vogels Nederl. Antillen, 1955, pp. 97-98.

to breed on Aruba Island, Curaçao, (Jan Thiel Baai)<sup>3</sup> and the Grenadines.

*Thalasseus maximus maximus* Boddaert

*Sterna maxima* Boddaert, Table Pl. enlum., p. 58, 1783. (Cayenne, ex Daubenton, pl. 988.)

This species had not been recorded as breeding on any of the Dutch or Venezuelan islands of the Caribbean Sea off the Venezuelan coast. A specimen, sitting on an egg, was collected by us on June 26, 1954, on Isla Noronquí of Los Roques archipelago.

According to Bond, it breeds throughout the West Indies but he does not include the islands off the Venezuelan coast in his West Indian range.

*Thalasseus eurygnatha* Saunders

*Sterna eurygnatha* Saunders, Proc. Zool. Soc. London, p. 654, 1876. (Santa Catharina, Brazil.)

This species had not been recorded as breeding on the Venezuelan islands of the Caribbean Sea. We collected two specimens sitting on their eggs on June 26, 1954, on Isla Noronquí of the Los Roques archipelago. Bond does not record the species from the West Indies, but recently Voous has reported it as nesting in Curaçao.

*Xiphocolaptes promeropirhynchus neblinae*, new subspecies

*Type*: From Cerro de la Neblina, headwaters of the Río Yatúa, Territorio Amazonas, Venezuela; 1800 meters. No. 59988, Phelps Collection, Caracas. Adult male collected January 24, 1954, by Ramón Urbano. (Type on deposit at the American Museum of Natural History.)

*Diagnosis*: Nearest to *X. p. orenocensis* Berlepsch and Hartert, of the upper Orinoco, Ecuador and Perú, from which it differs by having a chestnut tinge on the mantle, darker tail, the striped throat of *X. p. tenebrosus* Zimmer and Phelps, of the Gran Sabana region of Bolívar, darker brown under parts and shorter wing; from *tenebrosus* differs by the chestnut tinge on the mantle, darker tail and the more curved, longer and heavier bill of *orenocensis*.

*Range*: Known from the unique type from the Subtropical Zone, in deep forest.

*Description of Type*: Top of head dusky brown, the feathers with buffy white shaft lines which are more rufous on forehead and lores; back Brussels Brown, the shafts of feathers buffy, giving a fine lined appearance; mantle with a chestnut tinge; rump Auburn merging into the Chestnut of upper tail-coverts; sides of head pale buffy streaked with dark brown. Chin pale buffy; upper throat pale buffy with the feathers heavily edged with brownish giving a striped appearance, this merging into the Brussels Brown of the lower throat, breast, sides and flanks, the feathers of which have long narrow buffy white shaft lines; lower abdomen paler with some dusky speckling; under tail-coverts Brussels Brown indistinctly speckled with dusky. Remiges Auburn, under surfaces paler; inner vanes of primaries dusky apically; under surfaces of secondaries pinkish buffy basally; upper wing-coverts more

<sup>3</sup> Hartert. Ibis, p. 310, 1893; Voous, Vogels Nederl. Antillen, 1955, p. 101.



brownish; lesser coverts with buffy shafts; under wing-coverts and axillaries buffy, heavily barred with dusky. Tail Caron Brown, paler on under surface; shafts of rectrices very dark brown, light brown on under surfaces.

Bill (in life) "black, gray base"; feet "olive"; iris "dark." Wing, 130 mm.; tail, 120; exposed culmen, 48; culmen from base, 54; tarsus, 30.

*Remarks:* Range of measurements: *orenocensis*: five adult males (inc. type)—wing, 137-143 (139.4) mm.; tail, 106-118 (111.8); culmen from base, 54-56 (55.2); four adult females—wing, 131-139 (135.5); tail, 110-115 (113); culmen from base, 55-57 (56); *tenebrosus*: one adult male—wing, 125; tail, 109; culmen from base, 47.5; two adults of undetermined sex (inc. type)—wing, 121, 130; tail, 93, ?; culmen from base, 48, 49.

*Orenocensis* in Venezuela is known only from the lower Tropical Zone and *tenebrosus* from the upper Tropical Zone (700 to 1000 meters), while the new form was collected well up in the Subtropical Zone at 1800 meters.

#### Specimens Examined

*X. p. emigrans*<sup>4</sup>.—NICARAGUA: 1. GUATEMALA: 4.

*X. p. costaricensis*.—COSTA RICA: 6<sup>4</sup>.

*X. p. panamensis*.—PANAMÁ: 4<sup>4</sup>

*X. p. promeropirhynchus*.—COLOMBIA: 12<sup>5</sup>. VENEZUELA: 9<sup>4</sup>; 16<sup>6</sup>; Zulia: Cerro Pejochaina, Perijá, 4 ♂, 2 ♀; Cerro Mashirampé, 1 ♀, 1 (?) ; Campamento Avispa, 1 ♂; Cerro Alto del Cedro, 1 ♂, 4 (?) juv.

*X. p. virgatus*.—COLOMBIA: 4<sup>5</sup>.

*X. p. sanctae-martae*.—COLOMBIA: 9<sup>5</sup>.

*X. p. procerus*.—VENEZUELA: 12<sup>4</sup>; 24<sup>6</sup>; Guárico: Santa María de Ipire, 1 ♂.

*X. p. orenocensis*.—VENEZUELA: Terr. Amazonas: San Fernando de Atabapo, 3 ♀; Yapacana, 1 ♂; Nericagua, 1 ♂ (type)<sup>7</sup>; Munduapo<sup>7</sup>, 1 ♀, 1 (?) ; El Merey, 1 ♂<sup>7</sup>. ECUADOR: 1<sup>4</sup>. PERÚ: 1<sup>4</sup>.

*X. p. neblinae*.—VENEZUELA: Cerro de la Neblina, Terr. Amazonas, 1 ♂ (type).

*X. p. tenebrosus*.—VENEZUELA: Arabupú, Cerro Roraima, 1 ♂; Cerro Chimantá-tepui, 2 (?) (inc. type).

*X. p. ignotus*.—ECUADOR: 10<sup>5</sup>.

*X. p. crassirostris*.—PERÚ: 3<sup>5</sup>.

*X. p. phaeopygas*.—PERÚ: 1<sup>5</sup>.

*X. p. berlepschi*.—BRAZIL: 4<sup>4</sup>.

*X. p. lineatocephalus*.—BOLIVIA: 9<sup>4</sup>.

#### *Glyphorhynchus spirurus coronobscurus*, new subspecies

*Type:* From Cerro de la Neblina, headwaters of the Río Yatúa, Territorio Amazonas, Venezuela; 1400 meters. No. 59991, Phelps Collection,

<sup>4</sup> Specimens in the American Museum of Natural History. For localities see Zimmer and Phelps, Am. Mus. Nov., No. 1373, p. 4, 1948.

<sup>5</sup> Idem. For localities see Zimmer, Am. Mus. Nov., No. 753, p. 13, 1934.

<sup>6</sup> For localities see Zimmer and Phelps, Am. Mus. Nov., No. 1373, p. 4, 1948.

<sup>7</sup> Specimens in the American Museum of Natural History.

Caracas. Adult male collected February 1, 1954, by Ramón Urbano. (Type on deposit in the American Museum of Natural History.)

*Diagnosis:* Differs from all races of *G. spirurus* by darker, more dusky brown, crown; nearest to *G. s. rufigularis* Zimmer from which it differs additionally by more olivaceous, less brownish, under parts.

*Range:* Known from four specimens from Cerro de la Neblina in the Subtropical Zone at altitudes from 1400 to 1800 meters.

*Description of Type:* Crown Raw Umber, forehead more dusky; back nearest to Cinnamon-Brown, merging into the Burnt Sienna X Chestnut or uropygium; superciliaries and sides of head streaked with buffy white. Chin and throat browner than Zinc Orange, some of the feathers with dusky tips; breast, sides and flanks Saccardo's Umber, breast with buffy white saggitate shaft-spots; abdomen paler; under tail-coverts nearest to Sayal Brown. Wings Fuscous; exposed surfaces of upper wing-coverts uniform with back, those of primaries and secondaries more olivaceous and those of tertiaries Auburn; inner webs of secondaries and all but the three outer primaries with a broad band of Light Pinkish Cinnamon; under wing-coverts white, a brownish area on carpal angle; axillaries whitish. Tail Auburn, paler on under surface.

Bill (in life) "black, base purple"; feet "purplish gray"; iris "dark." Wing, 72.5 mm.; tail, 67; exposed culmen, 11; culmen from base, 13; tarsus, 16.5.

*Remarks:* Sexes alike in color but female smaller. Size similar to *rufigularis*. Range of measurements: two adult males (inc. type)—wing, 71-72.5 (71.7) mm.; tail, 65-65 (65); culmen from base, 13-13 (13); one adult female—wing, 64; tail, 57; culmen from base, 12; one adult of undetermined sex—wing, 62; tail, 59; culmen from base, 12. Measurements of *rufigularis*: see Zimmer, Peruvian Birds.<sup>8</sup>

The other races in Venezuela are of the Tropical Zone, sometimes reaching the lower subtropics.

#### *Specimens Examined*

*G. s. pectoralis*<sup>9</sup>.—MEXICO: 1. GUATEMALA: 1.

*G. s. sublestus*<sup>10</sup>.—COSTA RICA: 3. PANAMA: 14. COLOMBIA: 18. ECUADOR: 10.

*G. s. integratus*.—COLOMBIA<sup>7</sup>: Puerto Boyacá, 1 ♂; north of Cúcuta, 1 ♀; "Bogotá," 1 ♂. VENEZUELA: La Sierra, Perijá, Zulía, 1 ♂; La Fría, Táchira, 2 ♂; Santo Domingo, 1 ♂; Santa Bárbara, Barinas, 1 ♀.

*G. s. spirurus*.—VENEZUELA: 51<sup>11</sup>. BRITISH GUIANA: 28<sup>10</sup>; 11<sup>1</sup>. FRENCH GUIANA: 15<sup>9</sup>. BRAZIL: 2<sup>11</sup>; 47<sup>10</sup>. ECUADOR: 7<sup>10</sup>.

*G. s. amacurensis*.—VENEZUELA: 16<sup>11</sup>.

*G. s. rufigularis*.—VENEZUELA: 133<sup>11</sup>; 77<sup>10</sup>.

*G. s. coronobscurus*.—VENEZUELA: Cerro de la Neblina, Terr. Amazonas, 2 ♂ (inc. type), 1 ♀, 1 [♀].

*G. s. castelnaudi*<sup>10</sup>.—PERÚ: 39. ECUADOR: 8. BRAZIL: 17.

*G. s. albigularis*.—BOLIVIA: 2<sup>10</sup>.

<sup>8</sup> Am. Mus. Nov., No. 757, p. 3, 1934.

<sup>9</sup> Specimens in the American Museum of Natural History. For localities see Phelps and Phelps, Jr., Proc. Biol. Soc. Wash., 65, pp. 47, 48, 1952.

<sup>10</sup> Idem. For localities see Zimmer, Am. Mus. Nov., No. 757, pp. 6, 7, Nov. 30, 1934.

<sup>11</sup> For localities see Phelps and Phelps, Jr., Proc. Biol. Soc. Wash., 65, p. 47, 1952.

*G. s. inornatus*.—BRAZIL: 10<sup>10</sup>.

*G. s. cuneatus*.—BRAZIL: 31<sup>10</sup>.

*Platyrinchus mystaceus ventralis*, new subspecies

Type: From Cerro de la Neblina, headwaters of the Río Yatúa, Territorio Amazonas, Venezuela; 1900 meters. No. 60108, Phelps Collection, Caracas. Adult male collected January 24, 1954, by Ramón Urbano. (Type on deposit at the American Museum of Natural History.)

*Diagnosis*: Nearest to *P. m. ptaritepui* Zimmer and Phelps, but differs from all races of *mystaceus* by brighter, darker, more ochraceous breast and abdomen, less buffy or brownish. From *P. m. duidae* Zimmer, differs more than from *ptaritepui* as the former is still duller.

*Range*: Known from Cerro de la Neblina in the Subtropical Zone, in the deep forest.

*Description of Type*: Top of head Brownish Olive X Light Brownish Olive, with a semi-concealed Empire Yellow crown patch; back and rump Medal Bronze, more buffy on upper tail-coverts; lores, wide post-ocular and mystacial stripes blackish; auricular region buffy. Chin and throat white with lateral edges buffy; anterior breast, sides and flanks Buckthorn Brown, merging into the Yellow Ochre of posterior breast and abdomen; under tail-coverts buffy. Wings darker than Benzo Brown; remiges edged externally with olive brown, more widely on tertials; inner vanes of remiges edged with buffy, basally; upper wing-coverts, except primary ones, broadly but faintly edged with brownish olive; bend of wing Yellow Ochre; under wing-coverts mixed buffy and dusky; axillaries buffy. Tail darker than Benzo Brown.

Bill (in life) "maxilla black, mandible yellow"; feet "yellowish flesh"; iris "brown." Wing, 55 mm.; tail, 28; exposed culmen, 10; culmen from base, 14; tarsus, 16.5.

*Remarks*: Sexes different in color and male with longer wing. Size similar to *ptaritepui*. Range of measurements: two adult males (inc. type)—wing, 55, 54 mm.; tail, 28, 29; culmen from base, 14, 13; five adult females—wing, 50-52 (50.7); tail, 24-27 (25.8); culmen from base, 13.5-14 (13.8).

Another of our specimens is immature as shown by the rufous tinge of the back.

*Specimens Examined*

*P. m. mystaceus*.—BRAZIL: 20<sup>12</sup>.

*P. m. bifasciatus*.—BRAZIL: 14<sup>12</sup>.

*P. m. zamorae*<sup>12</sup>.—PERÚ: 6. ECUADOR: 11.

*P. m. albogularis*.—ECUADOR: 17<sup>12</sup>.

*P. m. insularis*.—TOBAGO: 10<sup>12</sup>. TRINIDAD: 10<sup>12</sup>. VENEZUELA: 17<sup>13</sup>. Lara: Cerro El Cogollal, 1 ♀; Cerro El Cerrón, 1 ♀. Yaracuy: Palma Sola, 1 ♂. Carabobo: Urama, 1 ♂, 3 ♀; Las Quiguas, 1 ♀; Colonia Chirgua, 1 ♂. Distrito Federal: San José de los Caracas, 1 ♂, 1 ♀. Miranda: Carenero, 1 ♂; Cerro Golfo Triste, 1 ♀; Cerro Negro, 2 ♂. Anzoátegui: Barcelona, 2 ♀. Sucre: Cerro Pan de Azúcar, 1 ♀; Cerro Papelón, 1 ♂; Cerro Azul, 8 ♂, 1 ♀. Guárico: Altagracia de

<sup>12</sup> For localities see Zimemr, Am. Mus. Nov., No. 1043, p. 8, 1939. Specimens in American Museum of Natural History.

<sup>13</sup> For localities see Zimmer and Phelps, Am. Mus. Nov., No. 1312, p. 14, 1946. Specimens in American Museum of Natural History.

Orituco, 1 ♀. Bolívar: Santa Rosalía, 1 ♀. Delta Amacuro: Misión Araguaímujo, 3 ♂, 2 ♀.

*P. m. imatacae*.—VENEZUELA: Bolívar: Cerro Tomasote, 2 ♂, 4 ♀.

*P. m. ptaritepui*.—VENEZUELA: Bolívar: Cerro Ptari-tepui, 3 ♂, 6 ♀, 1 juv.; Cerro Sororopán-tepui, 2 ♂, 1 ♀; Cerro Aprada-tepui, 1 ♂, 1 ♀.

*P. m. duidae*.—VENEZUELA: Bolívar: Cerro Roraima, 1 ♀<sup>7</sup>; Arapobó, 3 ♂, 3 ♀, 2 ♀<sup>7</sup>; Paulo, 1 ♂<sup>7</sup>; Santa Elena, 1 ♂. Amazonas: Cerro Duida, 1 ♂<sup>7</sup>; Cerro Yaví, 1 ♀.

*P. m. ventralis*.—VENEZUELA: Amazonas: Cerro de la Neblina, 2 ♂ (inc. type), 5 ♀, 1 juv.

*P. m. neglectus*<sup>12</sup>.—COLOMBIA: 6. PANAMÁ: 26. COSTA RICA: 11.

*P. m. dilutus*<sup>12</sup>.—COSTA RICA: 6. NICARAGUA: 8.

*P. m. cancrinus*<sup>12</sup>.—NICARAGUA: 8. GUATEMALA: 9.

### *Troglodytes rufulus wetmorei*, new subspecies

*Type*: From Cerro de la Neblina, headwaters of the Río Yatúa, Territorio Amazonas, Venezuela; 1850 meters. No. 60183, Phelps Collection, Caracas. Adult male collected—January 22, 1954, by Ramón Urbano. (Type on deposit at the American Museum of Natural History.)

*Diagnosis*: Differs from all other races of *T. rufulus* by pure unmixed gray throat, breast and abdomen, instead of whitish or rufous; dark olive brown flanks, instead of rufous; very prominently barred dusky and whitish under tail-coverts, instead of faintly barred rufous ones; darker, more brownish, upper parts and whitish superciliaries, instead of buffy rufous.

*Range*: Known only from the Subtropical Zone of Cerro de la Neblina at altitudes from 1800 to 1900 meters, in forest and open scrubby country.

*Description of Type*: Top of head, back and uropygium nearest to Chestnut-Brown X Auburn; lores and sides of forehead gray; a wide superciliary stripe, extending to neck, whitish; auriculars dusky and buffy brown. Chin nearest to Pale Olive-Gray, faintly barred with dusky; throat and breast nearest to Pale Olive-Gray; abdomen more whitish; flanks Prout's Brown X Cinnamon-Brown; under tail-coverts buffy whitish, heavily barred with blackish. Wings nearest to Cinnamon-Drab X Benzo Brown; outer webs of several outermost primaries faintly barred basally with buffy; outer webs of tertials chestnut brown barred with dusky; the innermost one completely barred; upper wing-coverts heavily margined with chestnut brown; bend of wing grayish white; under wing-coverts and axillaries dusky grayish. Tail buffy brown, finely barred with dusky, paler on under surface.

Bill (in life) "black, base flesh color"; feet "blackish brown"; iris "brown." Wing, 52.5 mm.; tail, 32; exposed culmen, 14; culmen from base, 18; tarsus, 23.

*Remarks*: Sexes alike. Size not different from the other subspecies, having the short wing of *T. r. yavii* Phelps and Phelps, Jr., and the long bill of *T. r. flavigularis* Zimmer and Phelps. Range of measurements: five adult males (inc. type)—wing, 52.5-54 (53.1) mm.; tail, 32-39 (36.4); culmen from base, 18-19 (18.4); three adult females—wing, 51-53 (52); tail, 33-37 (35.3); culmen from base, 18-19 (18.5).

Measurements of *T. r. duidae* Chapman, from Mt. Duida<sup>14</sup>: five males—wing, 55-59; tail, 37-41; culmen, 17-17.5; five females—wing, 54-57; tail, 37-38; culmen, 16-17.

This form has strikingly different coloration throughout than the other five known races, which all resemble each other more or less closely. However, as there is no difference in pattern, only color, and as it is manifestly a representative of *T. rufulus*, we prefer not to give it specific rank.

It is with great pleasure that we name this new form in honor of Dr. Alexander Wetmore, fellow member of the Cerro de la Neblina expedition, who always has placed entirely and unreservedly at our disposition his incomparable ornithological knowledge and experience.

#### *Specimens Examined*

*T. r. rufulus*.—VENEZUELA: cerros Roraima, Uei-tepui, Apradatepui and Chimantá-tepui, 31<sup>15</sup>; Cerro Roraima, 16 ♂, 10 ♀, 2 (?); Cerro Cuquenán, 7 ♂, 7 ♀, 3 (?).

*T. r. fulvicularis*.—VENEZUELA: cerros Auyan-tepui, Ptari-tepui and Sororopán-tepui, 19<sup>15</sup>.

*T. r. duidae*.—VENEZUELA: cerros Duida and Paraque, 28<sup>15</sup>; Cerro Duida, 2 ♂, 1 ♀; Cerro Parú. 9 ♂, 2 ♂ juv., 1 ♀, 2 (?); Cerro Huachamacare, 5 ♂, 4 ♀, 5 (?).

*T. r. yavii*.—VENEZUELA: cerros Sarisariñama and Yaví, 2<sup>15</sup>; Cerro Guanay, 3 ♂, 3 ♀, 3 (?).

*T. r. wetmorei*.—VENEZUELA: Cerro de la Neblina, 5 ♂ (inc. type), 3 ♀, 1 (?).

#### *Turdus olivater kemptoni*, new subspecies

*Type*: From Cerro de la Neblina, headwaters of the Río Yatúa, Territorio Amazonas, Venezuela; 1800 meters. No. 60204, Phelps Collection, Caracas. Adult male collected January 30, 1954, by Ramón Urbano. (Type on deposit at the American Museum of Natural History.)

*Diagnosis*: Differs from *T. o. roraimae* Salvin and Godman, *T. o. duidae* Chapman and *T. o. paraquensis* Phelps and Phelps, Jr., by darker abdomen, more grayish brown, less yellowish ochraceous; from *T. o. olivater* (Lafresnaye) of northern Venezuela the male differs greatly by lacking the extensive solid black throat; and from *T. o. sanctaemartae* (Todd) and *T. o. caucae* (Chapman) of Colombia by darker upper and lower parts.

*Range*: Known only from Cerro de la Neblina in the Subtropical Zone at altitudes from 950 to 1850 meters, in forest and open scrubby country.

*Description of Type*: Top and sides of head black with a slight brownish tint; back and uropygium Brownish Olive X Light Brownish Olive; chin brownish black, merging into the Light Brownish Olive throat which is heavily streaked with brownish black; breast Light Brownish Olive, the sides and flanks more Buffy Brown; abdomen more buffy; thighs and under tail-coverts Mummy Brown, the latter very faintly margined with light brown. Wings Fuscous X Benzo Brown; primaries

<sup>14</sup> Chapman. Am. Mus. Nov., No. 380, p. 22, 1929.

<sup>15</sup> For number and sex see Phelps and Phelps, Jr., Proc. Biol. Soc. Wash., 62, pp. 118-119, June 20, 1949.



narrowly edged with grayish olive; secondaries and tertials heavily margined with brownish olive uniform with back; primary wing-coverts dusky olive; outer webs of greater coverts, and entire lesser coverts, brownish olive uniform with back; under wing-coverts and axillaries buffy olive. Tail Bone Brown, paler on under surface.

Bill (in life) "orange yellow"; feet "brownish yellow"; iris "brown." Wing, 125.5 mm.; tail, 105; exposed culmen 22; culmen from base, 28; tarsus, 35.

Sexes unlike in color; male has longer wings and tail; size similar to *duidae*. Range of measurements: five adult males (inc. type)—wing, 125-130 (127.5) mm.; tail, 102-107 (104.4); culmen from base, 26-28 (26.9); five adult females—wing, 119-124 (121.4); tail, 96-102 (98.4); culmen from base, 26-28 (27). Measurements of *duidae* from Cerro Duida, in American Museum of Natural History<sup>16</sup>: wing, 122-133 (126); tail, 102-119 (109); culmen from base, 25-28.5 (27.1).

Female differs in color from male by having a less blackish head, more olivaceous; the throat is less heavily striped and the breast is paler.

A large collection of fresh topotypical skins of *T. o. roraimae*, from Mt. Roraima, made after the original description of *T. o. ptaritepui* Phelps and Phelps, Jr.<sup>17</sup>, shows that *ptaritepui* is not different from *roraimae*, so we synonymize it.

We dedicate this new bird to our friend Dr. James H. Kempton, who accompanied us to Cerro de la Neblina. The vast field experience of this eminent agricultural expert and his good humored companionship contributed greatly to the success of the expedition.

#### *Specimens Examined*

*T. o. roraim.*—VENEZUELA: cerros Roraima, 31 ♂, 9 ♂<sup>7</sup>, 16 ♀, 1 (♀); Cuquenán, 14 ♂, 10 ♀; Uei-tepui, 19 ♂, 1 ♂ Juv., 11 ♀, 1 ♀ juv., 1 (♀), 1 (♀) juv.; Ptari-tepui, 1 ♂, 1 ♂ juv., 6 ♀; Sororopante-pui, 1 ♀; Chimantá-tepui, 2 ♂, 6 ♀; Uaipán-tepui, 10 ♂, 9 ♀; Aprada-tepui, 10 ♂, 7 ♀, 4 (♀); Auyan-tepui, 4 ♂<sup>7</sup>, 1 ♀, 1 ♀<sup>7</sup>.

*T. o. duidae.*—VENEZUELA: cerros Duida, 2 ♂, 7 ♂<sup>7</sup>, 4 ♀, 7 ♀<sup>7</sup>; Huachamacare, 5 ♂, 3 ♀, 1 (♀); Yaví, 13 ♂, 1 ♂ juv., 8 ♀; Parú, 3 ♂, 3 ♀.

*T. o. paraquensis.*—VENEZUELA: Cerro Paraque, 7 ♂, 7 ♀, 1 (♀).

*T. o. kemptoni.*—VENEZUELA: Cerro de la Neblina, Territorio Amazonas, 9 ♂ (inc. type), 12 ♀.

*T. o. olivater.*—VENEZUELA: Zulia: La Sabana, Perijá, 3 ♂, 1 ♀, 1 (♀); Kunana, 1 ♂; Cerro Pejochaina, 2 ♂; Barranquilla, 1 ♂. Táchira: Las Delicias, Páramo de Tamá region, 1 ♀. Falcón: San Luis, 2 ♂; Curimagua, 5 ♂, 1 (♀). Lara: Cerro El Cerrón, 5 ♂, 1 ♂ juv., 3 ♀; Cerro El Cogollal, 1 ♂, 1 ♀ juv.; Cubiro, 1 ♂ juv., 1 ♀. Barinas: Altamira, 2 ♂. Yaracuy: Bucaral, 1 ♂. Carabobo: Sierra de Carabobo, 2 ♂ juv., 1 ♀ juv.; Cumbre de Valencia<sup>7</sup>, 5 ♂, 2 ♀. Aragua: Colonia Tovar, 5 ♂, 1 ♀, 2 ♀<sup>7</sup>; Cerro Golfo Triste, 1 (♀). Distrito Federal: El Junquito, 10 ♂, 1 ♀; Galipán<sup>7</sup>, 4 ♂, 2 ♀; Cotiza, 1 ♀<sup>7</sup>. Miranda: Curupao, 3 ♂; Cerro Negro, 1 (♀).

<sup>16</sup> See Chapman Am. Mus. Nov., No. 380, pp. 23, 24, Oct. 21, 1929.

<sup>17</sup> See Descripción de Cuatro Aves Nuevas de los cerros Paraque y Ptari-tepui y Notas sobre *Bubulcus ibis*, *Myioborus cardonai* y *Platycichla leucops*. Bol. Soc. Ven. Cien. Nat., No. 67, pp. 231-232, 1946.



*T. o. sanctae-martae*.—COLOMBIA: Valparaíso, Santa Marta<sup>7</sup>, 3 ♂, 2 ♀, 4 (?).

*T. o. caucae*.—COLOMBIA<sup>7</sup>: Cauca: La Sierra, 1 ♂, 1 ♀; Cauca, 1 ♂.

*Chlorospingus canicularis canicularis* (Lafresnaye)

*Tachyphonus canicularis* Lafresnaye, Rev. Zool., 11, p. 11, 1848. ("Bogotá".)

Táchira: 1 ♂, 1 ♀, Cerro El Teteo, Burgua; 1250 meters.

These specimens constitute an extension of range of the species from the western slopes of the Eastern Andes of Colombia to the south-eastern approaches to the Páramo de Tamá, in the Venezuelan Andes, about 25 kilometers from the Colombian boundary. They were compared with 14 specimens from Colombia in the American Museum of Natural History.

*Atlapetes personatus jugularis*, new subspecies

*Type*: From Cerro de la Neblina, headwaters of the Río Yatúa, Territorio Amazonas, Venezuela; 1800 meters. No. 60339, Phelps Collection, Caracas. Adult male collected January 30, 1954, by Ramón Urbano. (Type on deposit at American Museum of Natural History.)

*Diagnosis*: Nearest to *A. p. duidae* Chapman, of Cerros Duida and Guaiquinima, from which it differs, as well as from *A. p. parui* Phelps and Phelps, Jr., of Cerro Parú, by lighter rufous throat; from the other races of *personatus* differs more greatly because it has the rufous color entirely covering the throat and breast.

*Range*: Known only from Cerro de la Neblina.

*Description of Type*: Top and sides of head and nape Chestnut, merging into the Burnt Sienna of throat and breast; back and uropygium black, the upper tail-coverts faintly tinged with olivaceous. Abdomen Lemon Chrome merging into the dusky olivaceous sides, flanks, thighs and axillaries; under tail-coverts dusky edged with yellowish olive. Remiges Fuscous and Benzo Brown with under surface paler and outer vanes lightly edged externally with brownish white; margins of inner vanes pale grayish; upper wing-coverts black; bend of wing Chrome Yellow; under wing-coverts grayish. Tail black.

Bill (in life) "black, base brown"; feet "blackish brown"; iris "chestnut brown." Wing, 80 mm.; tail, 83; exposed culmen, 14.5; culmen from base, 16.5; tarsus, 29.

*Remarks*: Sexes alike in color but females have shorter wings and tail. Size similar to *duidae*. Range of measurements: five adult males—wing, 80-82.5 (80.7) mm.; tail, 80-84 (82.4); culmen from base, 16.5-17.5 (17); three adult females—wing, 71-76.5 (74.4); tail, 71-79 (74.7); culmen from base (2), 17, 17. Measurements of *duidae*, from Mt. Duida<sup>7</sup>: five adult males—wing, 77-80 (79.2); tail, 79-88 (81.8); culmen from base, 16-17 (16.8); three adult females—wing, 74-83 (76.2); tail, 70-79 (75.2); culmen from base, 17-17 (17).

*Remarks*: Description of juvenile. Top of head mixed brownish, chestnut and olivaceous instead of Chestnut; back brownish, mottled with black, instead of black; chin and throat largely yellowish olive mixed with some of the Burnt Sienna of breast.

*Specimens Examined*

*A. p. personatus*.—VENEZUELA: cerros Roraima, 10<sup>18</sup>, 20 ♂, 18 ♀, 6 (?); Cuquenán, 9 ♂, 9 ♀, 3 (?); Ptari-tepui, 22<sup>18</sup>; Sororopán-tepui, 2 ♀; Chimantá-tepui, 28<sup>18</sup>; Aprada-tepui, 11<sup>18</sup>; Acopán-tepui, 6<sup>18</sup>.

*A. p. collaris*.—VENEZUELA: Cerro Auyan-tepui, 1 ♀.

*A. p. paraquensis*.—VENEZUELA: cerros Paraque, 16<sup>18</sup>; Camani, 5 ♂, 3 ♀, 1 (?), 1 juv. (?); Guanay, 10 ♂, 5 ♀, 4 (?).

*A. p. parui*.—VENEZUELA: Cerro Parú, 24<sup>18</sup>.

*A. p. duidae*.—VENEZUELA: cerros Duida, 1 ♂, 7 ♂<sup>7</sup>, 1 ♀, 3 ♀<sup>7</sup>, 1 (?<sup>7</sup>); Guaiquinima, 24<sup>18</sup>.

*A. p. jugularis*.—VENEZUELA: Cerro de la Neblina, 8 ♂ (inc. type), 3 ♀, 2 ♀ juv., 6 (?), 2 juv. (?).

*Zonotrichia capensis inaccessibilis*, new subspecies

*Type*: From Cerro de la Neblina, headwaters of the Río Yatúa, Territorio Amazonas, Venezuela; 1900 meters. No. 60345, Phelps Collection, Caracas. Adult male collected January 20, 1954, by W. H. Phelps, Jr. (Type on deposit at the American Museum of Natural History.)

*Diagnosis*: Differs from all races of *Z. capensis* by darker, purer gray, less brownish, breast, sides and flanks. Nearest to *Z. c. macconnelli* Sharpe, of the summit of Mt. Roraima, from which it differs additionally by a more extensive and darker chestnut collar; the striping of back, and margins of tertials and upper wing-coverts more rufous; and longer bill. From *Z. c. roraimae* (Chapman), of Bolívar and Terr. Amazonas, differs as above and additionally by larger size and more extensively black crown.

*Range*: Known only from Cerro de la Neblina in the Subtropical Zone.

*Description of Type*: Top of head black with wide median stripe of dark gray, narrower on forehead; prominent lighter gray superciliary stripe extending from bill to neck; auricular stripes black; rest of face dusky gray, speckled with whitish under the eyes; a wide prominent collar, extending from sides of breast over the neck, Sanford's Brown; feathers of back blackish, heavily margined with brownish; uropygium more olivaceous than Mouse Gray. Throat white, the sides faintly speckled with grayish; lower throat with a wide black collar partially broken in the center; breast nearest to Light Grayish Olive; sides and flanks more brownish olive; abdomen whitish; under tail-coverts olivaceous brownish heavily margined with whitish. Remiges Benzo Brown, lightly margined externally with grayish; tertials and greater wing-coverts black, heavily margined externally with Burnt Sienna, the latter tipped with grayish; lesser wing-coverts black prominently margined with whitish; under wing-coverts and axillaries grayish white. Feathers of tail Benzo Brown on inner vanes, dusky brown on outer ones, narrowly margined with grayish except on outermost.

Bill (in life) "dark horn color"; feet "dark brown"; iris "brown." Wing, 69.5 mm.; tail, 65; exposed culmen, 13; culmen from base, 16.5; tarsus, 22.5.

*Remarks*: Sexes similar in color but males have longer wings and tail. Size similar to *macconnelli* but with longer bill. Range of mea-

<sup>18</sup> For number and sex see Phelps and Phelps, Jr., *Proc. Biol. Soc. Wash.*, 68, p. 47, April 26, 1950.

measurements: four adult males (inc. type)—wing, 69.5-71 (70.1) mm.; tail, 62-65 (63.7); culmen from base, 16.5-17.5 (17.1); two adult females—wing, 65, 67; tail (1), 59; culmen from base (1), 16.5. Measurements of *macconnelli*: one adult male—wing, 72; tail, 64; culmen from base, 15; two males<sup>19</sup>—wing, 71, 71; tail, 65, 65; two adult females—wing, 68, 69; culmen from base, 15, 15; two females<sup>19</sup>—wing, 67, 71; tail, 61, 65. Measurements of *roraimae*, from Mt. Roraima: five adult males—wing, 65-67 (66.2); tail, 57-60 (58.6); culmen from base, 14-15 (14.5); five adult females—wing, 62-62.5 (62.1); tail, 53-56 (54); culmen from base, 13.5-15 (14.1).

Description of juvenile male. Differs from the adult by dusky brownish crown, instead of black, with center stripes ill defined and more brownish; nuchal collar narrow and ill defined, buffy brown with dusky stripes; the large black spots on sides of throat are lacking, the entire under parts being whitish with yellowish tint on abdomen, the throat with small dusky spots, the breast sides and flanks heavily striped with blackish and the abdomen almost without stripes.

The Brazilian specimen of *roraimae* from the Rio Cotinga, listed below, was collected by Pinkus<sup>20</sup> on the headwaters of that river near the base of Mt. Roraima.

The summit of Cerro Uei-tepui, approximately 2000 meters, is on the boundary between Brazil and Venezuela; the same boundary east of Santa Elena de Uairén, where other Brazilian specimens were collected, has an altitude of 1000 meters.

#### Specimens Examined

*Z. c. costaricensis*.—VENEZUELA: Táchira: 28; Mérida: 30; Trujillo: 17; Lara: 7.

*Z. c. venezuelae*.—VENEZUELA: Zulia: cerros Pejochaina, Perijá, 2 ♂, 2 ♀, 4 (?); Tetarí, 1 ♀. Yaracuy: 1; Aragua: 9; Distrito Federal: 18; Miranda: 1; Monagas: 11.

*Z. c. roraimae*.—VENEZUELA: Bolívar: Arabopó, 5 ♂, 3 ♀; Kanabayén, 5 ♂, 1 ♀, 1 (?); Santa Elena de Uairén, 1 ♂, 1 ♂ juv.; cerros Roraima, 16 ♂, 14 ♀, 1 (?); Uei-tepui, 15 ♂, 3 ♂ juv., 13 ♀, 1 (?); Cuquenán, 9 ♂, 8 ♀, 1 (?); Paurai-tepui, 4 ♂, 1 ♂ juv., 3 ♀, 3 (?); Ptari-tepui, 1 ♂, 1 ♀; Sororopán-tepui, 1 ♀; Acopán-tepui, 3 ♂, 1 ♀; Upuigma-tepui, 5 ♂, 3 (?); Uaipán-tepui, 14 ♂, 14 ♀, 1 (?), 3 juv.; Auyan-tepui, 3 ♂, 4 ♀; Guaiquinima, 5 ♂, 3 ♀, 1 (?). Terr. Amazonas: cerros Yaví, 1 ♀; Guanay, 19 ♂, 11 ♀, 8 (?). BRAZIL: Rio Cotinga, 1 ♂; Cerro Uei-tepui, boundary on summit, 1 ♂; boundary, east of Santa Elena de Uairén, 5 ♂, 1 ♂ juv.; Uacará, on the Rio Negro<sup>21</sup>, 1 ♀. BRITISH GUIANA: Arabarú River, 2 ♀, 1 (?).

*Z. c. macconnelli*.—VENEZUELA: Bolívar: Cerro Roraima, summit, 1 ♂, 3 ♂, 2 ♀, 2 ♀.

*Z. c. inaccessibilis*.—VENEZUELA: Terr. Amazonas: Cerro de la Neblina, 4 ♂ (inc. type), 1 ♂ juv., 2 ♀.

<sup>19</sup> Specimens in American Museum of Natural History. See Chapman, Am. Mus. Nov., No. 341, p. 6, 1929.

<sup>20</sup> See Phelps, Resumen de las Colecciones Ornitológicas hechas en Venezuela. Bol. Soc. Ven. Cien. Nat., 61, Oct.-Dec., 1944, p. 397.

<sup>21</sup> For remarks on this specimen collected near Santa Isabel, about 200 kilometers SE of Cerro de la Neblina, see Chapman, Post Glacial History of *Zonotrichia capensis*. Bull. Am. Mus. Nat. Hist., 77, Art. 8, p. 398, Dec., 1940.



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A NEW TROPIDUCHID FROM JAPAN (HOMOPTERA:  
FULGOROIDEA)

BY R. G. FENNAH

The genus *Trichoduchus* comprises three species, *pilosus* (Hory.) from South Europe, *biermani* Damm. from Java, and *china* Wu (= *biermani* Muir not Damm.) from Macao, China. Our knowledge is based on extremely few specimens—not more than half a dozen in the case of the asiatic species—but it is evident that both brachypterous and macropterous forms occur, and that macropterous forms vary in the intensity of tegminal pigmentation.

The fortunate capture of a pair of *Trichoduchus* in Japan by Dr. P. W. Oman has greatly extended the known range of the genus. His specimens, which have been deposited in the U. S. National Museum, are described below. Thanks are tendered to Dr. Oman and Dr. David Young for the privilege of examining this rare material.

*Trichoduchus* Bierm.

Bierman 1910 *Nat. Mus. Leyd.* 33:28. Haplotype, *T. biermani* Damm. *loc. cit.*: 29.

***Trichoduchus japonicus* sp. n.**

(Fig. 1)

Vertex between basal angles as broad as long in middle line; clypeus with a subconical prominence near its middle. Posttibiae with two spines laterally, seven apically; basal metatarsal joint with four spines and one subspinose elevation.

Ochraceous yellow; head and thorax marked with fuscous brown as shown in figures; thoracic pleurites fuscous with edges narrowly pale stramineous, femora coarsely speckled and tibiae twice ringed with fuscous, abdomen fuscous except at lateral margins. Tegmina (brachypterous) fuscous-piceous; about fifteen cuneiform spots around margin from base of costa to apex of clavus, three or four narrow transverse bars in basal third of cell Sc + R, a narrow transverse bar and a quadrate area in basal third of discal cell M, an irregular area between Cu 1 and claval suture, and about five small areas in clavus, three of them along posterior margin, hyaline. Veins concolorous with ground. Wings absent.

Anal segment of male short, apical margin transverse, anal foramen at middle. Pygofer moderately broad, posterolateral margins shallowly convex. Aedeagus with phallus long, narrowly tubular, weakly sigmoid, surrounded in its basal sixth by a membranous collar (phallobase) from which arises on left a slender filament which lies alongside phallus to

its apex, and a rather stouter ventral median subfilamentous process lying below phallus. Genital styles irregularly trapezoidal with ventral margin longest and dorsal margin shortest, apical margin very oblique; dorsal margin bearing a short vertical lobe near base, and distally a hook-like process, directed laterad, and a ledge-like flange on inner face arising at same level as this process.

Female genitalia as figured.

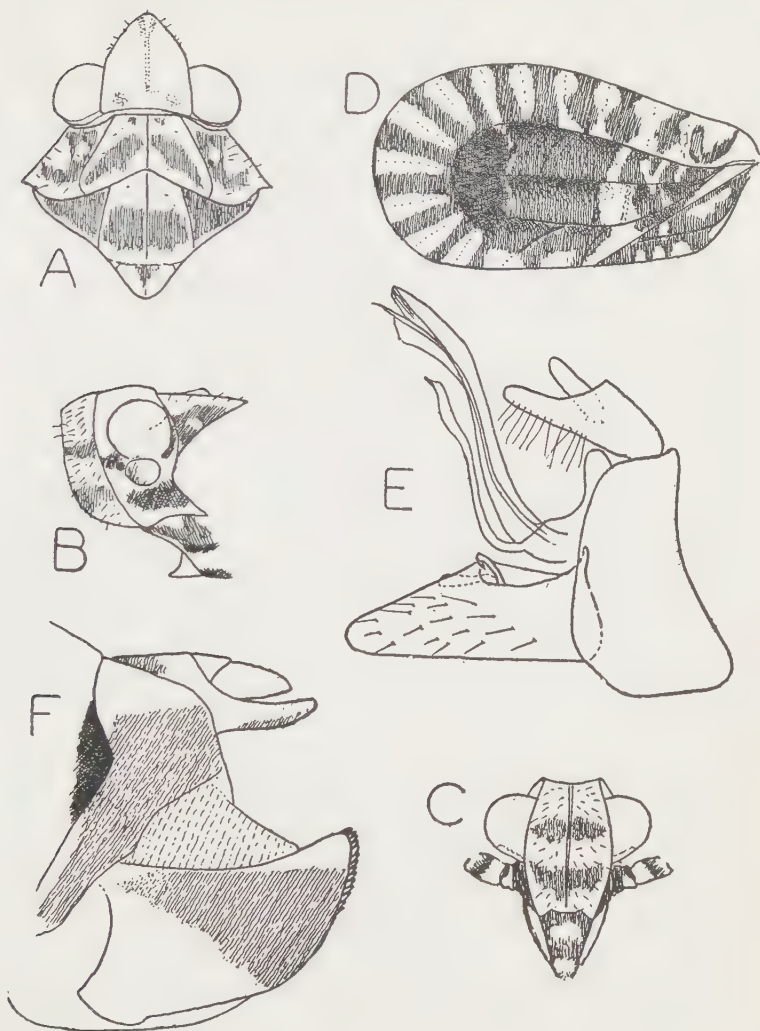
Male: length, 3.1 mm.; tegmen (brachypterous), 2.8 mm. Female: length, 3.5 mm.; tegmen (brachypterous), 3.0 mm.

Holotype male of species and one female, Japan: Honshu, Kyoto, Oct. 5, 1951, Oman.

This material differs from *T. pilosus* (Horv.) in the proportions of the vertex, and from *T. biermani* Damm. and *T. china* Wu in tegminal venation and markings. It agrees to some extent with the incomplete description of *T. china* but most of the points of agreement are probably of generic value: this is almost certainly so with the female genitalia. It differs from *T. china* in the pigmentation on the frons and thorax, and in the pallid markings of the tegmina: these in *T. china* have yellow veins on a dark ground and three round yellowish spots, one in each of the first and second median cells and a third over the radius, as in *T. biermani*.

It is perhaps worth adding that although *T. biermani* and *T. china* are here accepted at their nominal value as distinct species, the differences between them have never been explicitly stated and cannot be satisfactorily inferred from the descriptions.







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THE FAMILY CLAUSIIDAE (COPEPODA,  
CYCLOPOIDA)

BY MILDRED STRATTON WILSON

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and

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There has crept into the literature on poecilostome Cyclopoida a misconception of the family Clausiidae. This seems in part, at least, to be traceable to the fact that in his diagnosis of this group, G. O. Sars (1918) did not sufficiently clarify its status, and some workers gained the impression that he was erecting a new family. To what extent he was aware of the discussions in the literature, it is not possible to judge. His own discussion is very brief. He mentions *Clausia* as the type of the family, refers to it his new genus *Conchocheres*, and suggests that *Myicola* Wright might also be included in the group.

Monod and Dollfus (1932) in their important and useful summary of the copepod parasites of Mollusca, considered that Sars was the author of this family. They added to it a few other genera, and stated that it is evidently closely allied to the Ergasilidae. In a later paper of this series (1934) they pointed out that the family was poorly defined and perhaps not a natural group, because one of the characters accepted as fundamental by them and Sars, that is, the absence of the maxilliped in the female, might be a generic character. C. B. Wilson (1932) had referred *Myicola* to the Lichomolgidae, and influenced by this, Monod and Dollfus suggested that the Clausiidae might in time be absorbed by the Lichomolgidae.

Yamaguti (1936) created, without diagnosis, a family Myicolidae, in which he placed *Myicola* and *Pseudomyicola*, a new genus. To the Clausiidae he referred, without comment, several other Japanese genera and species commensal in Mollusca.

There has thus grown up a concept of the family Clausiidae based upon the premises that Sars is its author, that it is comprised of mollusk parasites or commensals, that the female lacks the maxilliped, and that it is closely allied to the Ergasilidae and Lichomolgidae. The facts, however, are quite different. It is necessary only to trace the references to the type genus, *Clausia*, through the literature, to find that the fam-

ily was instituted by Giesbrecht, that it is composed of copepods mostly associated with annelids, that the maxilliped is present in the female, and that the opinion is held that the group is most closely allied to the Clausidiidae.

*Clausia lubbockii* was described by Claparède in 1863 from specimens collected in a plankton tow. Giesbrecht (1893) redescribed the species from a specimen found in a vial containing marine annelids that occurred on oyster shells. Since the characters of the copepod exhibit the modifications and reductions characteristic of annelid commensals, he was probably correct in assuming that the association with the worms was not incidental. Giesbrecht's description and illustrations are most excellent, providing the details of all the significant appendages. He refers to those of the oral area as mandible, the first maxilla, the second maxilla, and the maxilliped. This latter appendage is of a reduced nature, unsegmented, insignificant in size and armed apically only with hairs.

In the description of a new genus *Seridium*, Giesbrecht (1895) pointed out that it was closely allied to *Clausia* and to *Rhodinicola* Levinsen (1878), and stated that (p. 226) "diese drei Anneliden Parasiten zu einer engeren systematischen Gruppe (Familie Clausiidae) zusammenzufassen waren." The family is thus attributable to Giesbrecht (1895) not to Sars (1918).

Only two authors have referred directly to Giesbrecht's work—Gravier (1912 and C. B. Wilson (1923). Gravier (p. 67) discussed Giesbrecht's interpretation of the family and added to it his genus *Bactropus*. Wilson referred to the works of Giesbrecht and Gravier and added to their lists a new genus *Pherma* which had been collected from the parapodia of an unnamed annelid.

Chronologically, Sars' diagnosis of the Clausiidae follows Gravier's paper. Throughout his monumental work on the crustacea of Norway, he did not trace the synonymy of families, and it is not always easy to tell even if the family is newly created. In the case of the Clausiidae at least this has been unfortunate. Sars' diagnosis is very broad and in many ways indefinite, as seen particularly in his meaningless description of the mouth parts: "Oral parts more or less imperfectly developed; the posterior maxillipeds being in female rudimentary or quite absent." By "rudimentary" he undoubtedly referred only to those of *Clausia*, by "absent" to the condition in his new genus *Conchocheres*. His description of the posterior antenna as being "distinctly prehensile" is somewhat questionable in the case of *Clausia*. The combined armature of several weak, somewhat modified claws and long setae seems to make the term "subprehensile" more appropriate.

None of these authors referred to the genus *Mesnilia* Canu (1898). Canu did not assign *Mesnilia* to the Clausiidae, but did point out its undoubted resemblance to *Clausia*. It rather appears that he may not have been aware that Giesbrecht had established this family two years before. His suggestion (p. 402) that *Clausia cluthae* T. and A. Scott (1896) should be included in *Mesnilia* rather than in *Clausia* has some merit, although as he emphasized, the knowledge of the oral appendages of this species is imperfect (see below, p. —).

Mesnil and Caullery (1916) further pointed out the similarity of

*Mesnilia martinensis* to *Clausia lubbockii*. They followed Canu in not referring to the family Clausiidae, or to Giesbrecht's paper on the genus *Seridium*. Their work is of importance in establishing as host of *Mesnilia martinensis*, the annelid, *Polydora flava*.

The references reviewed above constitute the only discussions of the family Clausiidae of which we have knowledge in the literature. It seems desirable that consideration should be given here to the diagnostic characters of the family so far as they can be ascertained, and to the genera that have been, correctly or incorrectly, assigned to the family.

#### Diagnostic Characters of the Clausiidae

Giesbrecht did not give a formal diagnosis of the family that he had proposed, but in comparing the females of the three genera he drew together in this group, he mentioned the characters he considered basic in showing their relationship. These, which may be taken as outlining the original concept of the family, are:

Structure of the body.

Similarity of the posterior antennae and mouth parts.

Reduction of the thoracic legs in varying degrees.

Association with the Annelida.

In presenting here a diagnosis of the family we do so with certain reservations. The genera are restricted to those which are most adequately described, and the characters include those considered basic by Giesbrecht, except for the structure of the body. The genera of which Giesbrecht had knowledge possessed a similar elongate body, but since it is likely that these similarities could be due to convergence as well as to phylogeny, this cannot be considered a family character. Indeed, it is questionable, at least among the poecilostome Cyclopoida, whether body form is ever more than a specific character. Further, the desirability of reexamination of all the genera and species concerned, is recognized. A truly comprehensive diagnosis can be presented only upon the actual and accurate comparison of specimens of the species involved. In the meantime, the following diagnosis gives a summary of characters upon which pertinent discussion can be based.

#### Family CLAUDIIDAE Giesbrecht 1895

*Diagnosis* (emended).—Antennules short, 4-6 segmented. Antenna 3- or 4-segmented, the two terminal segments armed with setae and sub-prehensile claws of varying number and size; the terminal segment showing a definite tendency to reduction and in some cases to an offset lateral position. Mandible reduced in size, with a posteriorly directed terminal claw or modified "cutting" portion, with or without other accessory pieces or setae. The first maxilla stouter or more reduced than the mandible, a simple, elongate lobe bearing setae placed in one or two groups; its basal attachment more laterally situated than that of the mandible from which it is clearly distinct. The second maxilla and the maxilliped varying among the genera. Second maxilla bimerous, the basal segment tending to great expansion, terminal segment a stout claw or a modified claw. Maxilliped present in the female, of a single unmodified segment armed apically with hairs or spinules (*Clausia*) or a simple claw (*Teredicola*) or of 3 or 4 well-defined segments with an

apical (*Rhodinicola* ?) or subapical claw and terminal knob (*Seridium*) or a platelike development of the apex (*Mesnilia*). The maxilliped in the only known male (*Teredicola*) with a long terminal claw.

Legs 1-4 showing various degrees of reduction, both in size of the appendage and segmentation of the rami, some pairs may be completely absent; leg 5 varying in size and segmentation, not always present (see Table I).

Known genera associated with Annelida and Mollusca (*Teredinidae*).

*Family type*.—*Clausia* Claparède.

*Included genera*.—*Clausia*, *Seridium*, *Mesnilia*, *Teredicola*.

*Inadequately known*: *Rhodinicola*.

#### Discussion of the Genera

There is no question about the inclusion of *Clausia* and *Seridium* in the Clausiidae since Giesbrecht built the original family concept on his knowledge of these genera. Canu pointed out the undoubted resemblance of *Mesnilia* to *Clausia* and it is included here without qualification because it exhibits the important family characters of the antenna, the mandible and the legs. Such differences as exist may be found upon further investigation to be specific rather than generic in nature. The most striking difference is the structure of the female maxilliped, an appendage exhibiting considerable variability throughout this group of genera. Since it is the character that has been most misinterpreted, it is well to stress that this appendage is rudimentary only in *Clausia lubbockii*.

The inclusion of *Teredicola* C. B. Wilson needs some qualification and furthermore is dependent upon the correction of some errors in the description of the type and only known species, *Teredicola typica*. C. B. Wilson (1942, 1944) has wrongly interpreted the segmentation of the body in the female, showing the ovisacs as attached to the segment posterior to the actual genital somite. This error has been corrected in an illustration, without comment, by Edmondson (1945, fig. 1) who shows not only the correct position but the distinctive membranous process by which the ovisacs are attached to the genital opening. Giesbrecht has noted a similar process in *Seridium*. The antennule is 5-, not 6-segmented. The mandible and first maxilla were not mentioned by Wilson, and though he has accurately described the second maxilla and maxilliped, the drawing of one of these (probably the maxilliped) has been mislabeled "second antenna" (C. B. Wilson, 1942, fig. 1e). Actually, he neglected to figure the antenna which is closely similar to that of the other well defined genera of the Clausiidae. A single claw is borne on an extended portion of the penultimate segment and a group of stiff setae on the small laterally offset apical segment. The mandible has in addition to a broad terminal serrate blade, two dorsally placed accessory pieces, one a stout seta, the other a somewhat flattened foliate structure. The maxilliped of the male is different from that of the female, having two well developed basal segments and an elongate apical claw. Both sexes have two pairs of extremely small legs with 2-segmented rami (Table I).

*Teredicola typica* differs from the other Clausiidae in having the forepart of the body of the female exceedingly swollen. This does not



exclude it from the group since, as pointed out above, body form is not a family character. The second antenna with its combined armature of setae and single claw; the shortened mandible with its backwardly directed terminal piece; the elongate but simple first maxilla, inserted far laterally to the base of the mandible; and the reduction of the legs are all unmistakable clausiid characters. The armature of the mandible is more complex than the simpler structure shown for *Clausia lubbockii* by Giesbrecht or for *Mesnilia martinensis* by Canu. In this respect alone, *Teredicola* appears more closely allied to the Clausiidae.

Since the copepod commensals of the Annelida have been little investigated, it is hardly surprising that *Rhodinicola elongata* Levinsen (1878) has not been redescribed. We have followed Giesbrecht in including *Rhodinicola* in the list of clausiid genera, but with reservations. It is not absolutely certain that the species would be recognizable from Levinsen's description. Nor can it with any more certainty be included in the family because the details of the second antenna and mandible are lacking, and the first maxilla has been entirely omitted in the illustrations. The mandible is shown as an unsegmented, posteriorly directed blade. The second maxilla is of simple structure with a stout apical claw, as in *Teredicola*; the maxilliped is composed of four slender segments. The legs are extremely reduced in size, but are described as having the rami completely segmented, differing in this respect from the other genera (see Table I).

Giesbrecht suggested that *Donusa* Nordmann (1864) might be synonymous with *Rhodinicola*. Such an opinion is hardly acceptable in view of the inadequate knowledge of both genera, and some probable inaccuracies in Nordmann's description. According to Nordmann, legs 1-4 are biramose with trimerous rami, which would agree with *Rhodinicola*. His further statement that leg 5 is biramose with 3-segmented rami was considered questionable by Giesbrecht (1895, p. 225). Certainly all the information accumulated since Nordmann, justifies Giesbrecht's objection because no copepod except in the Calanoida has ever been found with biramous fifth legs. It is difficult to understand why C. B. Wilson in his study of the Dichelesthidae (1922) should have characterized Nordmann's description and figures as "clear-cut and decisive" and should have accepted this obviously fantastic condition. In placing the genus in the Dichelesthidae, he undoubtedly followed Nordmann who had referred *Donusa* to this group. Nordmann emphasized that the second antenna of *Donusa* was not developed into a "Klammerapparat" as in *Lamproglena* (Dichelesthidae), a point which makes it seem likely that relationship to the highly modified dichelesthid group is not tenable. It must be concluded that neither the systematic position of *Donusa* nor the identity of its type species can be resolved until the form is again collected and identified with certainty.

In comparing the known annelid parasites having elongate bodies, Giesbrecht also referred to the genus *Sabellacheres* M. Sars (1861). He pointed out that List (1890) had suggested that this genus is very close to or congeneric with *Gastrodelphys*. The only knowledge of *Sabellacheres* is from the original brief Latin diagnosis which though obscurely formulated seems to bear out the opinion of List. Certainly there is no evidence for its inclusion in the Clausiidae, and it is not

TABLE I.  
Number of Segments in Legs of the Clausiidae

|                             | Leg 1 |      | Leg 2 |      | Leg 3       |      | Leg 4                    |      | Leg 5                    |
|-----------------------------|-------|------|-------|------|-------------|------|--------------------------|------|--------------------------|
|                             | exo   | endo | exo   | endo | exo         | endo | exo                      | endo |                          |
| <i>Clausia lubbockii</i>    | 3     | 2    | 3     | 2    | 1           | 0    | reduced to knob and seta |      | 2                        |
| <i>Clausia cluthae</i>      | 3     | 2    | 3     | 2    | 3           | 1    | 3                        | 1    | 2                        |
| <i>Seridium rugosum</i>     | 2     | 1    | 2     | 1    | 2           | 1    | 2                        | 1    | reduced to knob and seta |
| <i>Rhodinicola elongata</i> | 3     | 3    | 3     | 3    | 3           | 3    | 3                        | 3    | 2                        |
| <i>Mesnilia martinensis</i> | 3     | 3    | 3     | 3    | 3           | 0    | 3                        | 0    | 2                        |
| <i>Teredicola typica</i>    | 2     | 2    | 2     | 2    | leg lacking |      | leg lacking              |      | leg lacking              |

believed that Giesbrecht intended so to infer.

The inclusion in the Clausiidae of *Bactropus* Gravier, *Pherma* C. B. Wilson, and *Conchocheres* G. O. Sars, would require modification of the restricted definition given above. These genera are regarded by us as possible members of the group, but their inclusion requires further description or clarification of pertinent appendages. The reduction of the urosome in *Bactropus* and *Pherma* hardly appears a valid reason for excluding them from the family, and it is not so construed. *Bactropus cystopomati* should be readily recognizable from Gravier's description. But since it does have some unusual features, it would be well to know in more detail the exact structure of the oral appendages, particularly the mandible, before its familial position is determined. The same applies to *Pherma*, which indeed, it would be impossible to assign to any family, since C. B. Wilson omitted a description of the oral appendages. Here it should be noted that a genus proposed later by Wilson (*Pestifer*, 1944) has a superficial resemblance to *Pherma* in body form and the structure of the antennule (first antenna) and the possible congeneracy of the two should be investigated. Wilson referred *Pestifer* to the Clausiidae, but here again evidence of familial position is lacking because the oral appendages were not described.

Similar reasons apply to *Conchocheres*. The lateral extensions of the cephalic somite, the unreduced condition of legs 1-4, the absence of the maxilliped in the female, and its association with a mollusk rather than an annelid, are not necessarily great enough differences to exclude the genus. There is, however, a basic concept in Sars's interpretation of the relationship of the first two pairs of oral appendages that is in contradiction to the facts of structure observed by us and other authors who have examined the recognized genera of this family. He has subscribed throughout his work to the premise that in the *Poecilostoma* the lobelike structure called first maxilla by many other authors is only the palp of the first maxilla, and in his illustrations he has always shown this structure attached to the appendage considered by others as the mandible. In all other illustrations in the literature reviewed here, and in *Teredicola* which we have examined, these two structures are clearly distinct from one another. The form of the first maxilla in *Teredicola* is elongate and it arises laterally far beyond the discernible base of the mandible.

In *Conchocheres*, the mandible (first maxilla of Sars) as pictured *in situ*, is directed posteriorly; the enlarged view shows it to be unsegmented, produced apically to a minute claw and armed with very small accessory spines. Such structures is not ergasilid or lichomolgid in nature, and it is recognized that this apparent simplicity might be interpreted as an example of reduction from the somewhat more developed armature of the clausiid type. Such might also be true of the structure of the second antenna, whose terminal armature consists of a single, short, but very stout claw. The latter is, however, a noticeable departure from the basic clausiid antennal structure, which in combination with the characters of the mandible and the lack of reduction in legs 1-4, may indicate that *Conchocheres* belongs to a different systematic group. It would therefore be well that inclusion in or consequent modification of the family be reserved until reexamination of the

genus determines the actual relationship of the oral appendages. Even with exact knowledge, it will probably be necessary to await discovery and adequate elucidation of other related genera before a proper evaluation of these characters can be made.

Of the genera that have been erroneously ascribed to the Clausiidae, either directly or by inference, the following dispositions may be made.

*Myicola* R. R. Wright, referred to this family by Sars (1918) and Monod and Dollfus (1932), was placed in the Lichomolgidae by Pelseneer (1928) and C. B. Wilson (1932) and, by inference, in a family Myicolidae, erected without diagnosis, by Yamaguti (1936). The systematic position of *Myicola* is without doubt that ascribed to it by its author, who stated quite clearly (Wright, 1885, p. 120): "it occupies a position intermediate between *Lichomolgus* and *Ergasilus*."

A species described by Williams (1907) as *Lichomolgus major* and erroneously referred to *Myicola* by C. B. Wilson (1932) was placed in the Clausiidae by Monod and Dollfus (1934, p. 316). This species has been made the type of a new genus, *Myocheres* M. S. Wilson (1950). It is undoubtedly allied to the Clausiidae rather than to the Ergasilidae or Lichomolgidae. It has not here been placed in the Clausiidae because of the lack of reduction in the legs and the difference in the apical pieces of the mandible, which exhibit unique modifications. That it may form with other as yet unknown forms, a subdivision of the Clausiidae, or a separate allied family, is possible. On the other hand, when more knowledge is available, the Clausiidae may come to be interpreted or modified in such a way as to include it.

Monod and Dollfus (1932) included *Mytilicola* Steuer and *Trochicola* Dollfus. We hesitate to suggest any disposition of these highly modified forms, but certainly they do not appear from present knowledge to be referable to the Clausiidae. The absence of the mandible and the maxilliped in the adult may well be only generic characters, but the large prehensile second antenna removes them from possible consideration as members of the Clausiidae. Hockley (1951) has described the mandible of *Mytilicola intestinalis* in an early copepodid stage. The simplicity of its structure gives no indication of relationship to other genera. In a recent paper, Humes (1954) has presented a good summary of the taxonomic studies on *Mytilicola* and has both illustrated and tabulated the specific differentiation within the genus. He raises the question of the seemingly possible congeneracy of *Mytilicola* and *Trochicola*.

The inclusion of *Lecanurius* Kossmann (1877) as suggested by Monod and Dollfus (1932) cannot be justified on the basis of its description. The genera proposed by Pelseneer (1928), also suggested for inclusion by Monod and Dollfus (1932, footnote, p. 154), are inadequately described, the oral appendages and second antennae entirely unknown; their identity is establishable only from types or topotypes. This has been recently ably done for *Tococheres cylindraceus* by Stock (1954) who has placed the genus correctly in the clausiidae. Stock further mentions that Pelseneer's types do not appear to be in existence. *Panaetis* Stebbing, originally considered by Monod and Dollfus as a clausiid, was more correctly assigned by them (1934) to the Lichomolgidae. Such a disposition is also more accurate for the genera *Philoconcha* and *Para-philoconcha* placed in the Clausiidae by their author, Yamaguti (1936).

Both of these have a characteristic lichomolgid type mandible.

T. Scott (1902) proposed a new genus and species, *Pseudopsyllus elongatus*, which he compared to *Clausia*. It is evident from the structure of the maxilliped that the specimen described by Scott was a male, and not a female as he had supposed. This was the only oral appendage described so that the actual identity of Scott's specimen is not determinable, nor can it be judged if it represents a valid genus. The structure of the second antenna is of the clausiid or clausidiid type. The legs are too well developed to admit the form to the Clausiidae in the present restricted definition.

#### Systematic Position of the Clausiidae

The supposed relationship of the Clausiidae to the Ergasilidae and Lichomolgidae has been based upon the erroneous interpretation that has recently been given to this family, and is not tenable. On the other hand, the recognition by Giesbrecht and Canu of structural similarities between the Clausiidae and the Clausidiidae has a basis in fact as well as considerable merit. These two authors have presented the most complete and seemingly accurate studies of the genera assignable to the Clausiidae. They have also studied quite thoroughly several examples of the family Clausidiidae. Canu has, in fact, presented in his paper establishing this family (Canu, 1888) not only a most complete and exacting study of his examples, but one of the most admirable and useful papers ever published in the field of the Copepoda.

Giesbrecht (1893) in his redescription of *Clausia lubbockii* stated that *Clausia*, like *Hersiliodes*, shows relationship through the structure of both pairs of antennae, the maxilla and the mandible, to the Oncaeidae. Canu also commented on this. In his paper on *Mesnilia* (Canu, 1898) he recorded the genus thus: "Fam. incerta (Hersiliidae pars?)", and in discussion stated that "*Mesnilia* and *Clausia* approach in many points the Hersiliidae<sup>1</sup> and the Oncaeidae." It appears to us that the Oncaeidae present a rather confused complex of characters, some of which are primitive for the Poecilostoma, others highly derived planktonic modifications, so that it would seem impossible to arrive at such a far reaching conclusion as these earlier workers did. The differences between the Clausiidae and Clausidiidae, however, are of a less encompassing nature, and there is doubtless a valid and close relationship between them. Indeed, further study may reveal intermediate conditions such as seem to exist in the mandible of *Teredicola*, so that copepod systematics may best be served by merging the two families or by establishing an inclusive higher category.

The Clausiidae exhibit more evidences of reduction than is found in the commonly known genera of the Clausidiidae (*Clausidium*, *Hemicyclops*, *Hersiliodes*). In spite of this, there are strong resemblances, particularly in the second antenna with its tendency to reduction and offset position of the ultimate segment, and in the armature of the mandible. It may be of systematic importance that in these two groups, the terminal portion of the mandible blade is more or less expanded and always strongly directed posteriorly. The modified apical pieces, some of which are always stout setae when more than one is present, do not all arise in exactly the same plane, but are instead attached to separate

<sup>1</sup>The Hersiliidae is the present day Clausidiidae, renamed by Embleton (1901).



lobes or arranged in an irregular series around the more or less thickened apex of the blade. This forms a striking contrast to the anteriorly directed, flattened blade of the well known *Ergasilus*, of *Myicola*, and of the genera of the Lichomolgidae.

Paragnaths, which are lacking in the Ergasilidae and Lichomolgidae, are present in the Clausidiidae. They have not been reported in the literature on the Clausiidae, but in two instances, their presence is suggested. In the illustration of the oral area of *Mesnilia* (Canu, 1898, pl. 8), the first maxilla is depicted as having an accessory lobe. Canu has described the appendage thus: "Les maxilles se composent d'une partie basilaire armée de deux soies courtes vers l'intérieur et prolongée par un lobe distal saillant au-dessus de la base des mandibules et accompagné de trois soies en partie barbelées." The illustration does not present any evidence that the three setae are part of the projecting lobe, and the question arises as to whether it is actually a part of the maxilla. Since Canu has so adequately recognized paragnaths in the Clausidiidae, one would expect him to interpret them correctly if they are present in *Mesnilia*. As this structure is so peculiar, however, it would be well that *Mesnilia martinensis* be reexamined for a more complete delineation of the first maxilla and the possible presence of paragnaths. Such study might be most instructive if direct comparison could be made with specimens of *Clausia lubbockii* which also has a comparatively large first maxilla.

Canu (1898, p. 402) in suggesting that *Clausia cluthae* T and A. Scott (1896) might be referable to *Mesnilia*, pointed out that knowledge of the buccal appendages is imperfect. Examination of the illustrations of this species certainly bears this out, and we suggest that either the captions have been transposed, or that the appendages have been confused with one another in dissection. The magnification given for figure 7 (X 760) is much greater than that for the other figures so the appendage must be smaller. From both this lesser size and its structure it seems likely that this figure represents the mandible, although it is labeled "anterior foot jaw" (second maxilla). Figure 5 is labeled mandible, but both structure and comparative size suggest that the lobe bearing the three setae is the first maxilla or a portion of it. The hairy lobe partially overlying the setiform structure may well represent a paragnath. Figure 6, labeled "maxilla" may be a modified terminal portion of the second maxilla or of the maxilliped, similar to that depicted for *Mesnilia martinensis*. When this species is reexamined the possibility of such confusion should be borne in mind.

Structures interpretable as paragnaths have been found in *Teredicola*. These are simple, unornamented, lobed swellings jutting up from the ventral surface posterior to the mandible and filling the space just distad to the inner portion of the maxilla. Sinuous, ornamented paragnaths are present in a similar position in *Myocheres major*.

#### The Need for Further Study

In the discussions of the genera concerned in this review, it has been necessary to qualify the interpretation of, or suggest the need of further investigation of many structures and genera. It should be well recognized by all workers in the Poecilostoma that with such incomplete



knowledge, it is impossible to delimit many of the genera in family groups. This appears to be the result of two circumstances:

1. The inadequacy of collections, suggesting that many forms are yet unknown.
2. The inadequacy of description, particularly of the details of the seemingly fundamental characters found in the cephalic appendages and the impinging structures of the buccal area.

It is important, therefore, that the student of these copepods direct himself to careful and systematic collecting, and to precise, detailed study of the specimens. The proposal or acceptance of genera or species based only upon body shape, or upon appendages such as the antennule, the posterior oral appendages, and thoracic appendages, which appear to have a limited systematic importance, will always lead to confusion. We do not feel that we are being too exacting to suggest that no species or genus should be proposed without thorough delineation of all the appendages. Particular attention should be given to the exact details of the antenna and the mandible. The buccal region should be studied both *in situ* and in dissection, for the relationships of the appendages and the character of the surrounding structures, such as the labrum, labium, paragnaths and postoral protuberances are also of systematic importance. It is only through such description that we will gradually come to know these puzzling copepods well enough to derive the critical concepts necessary to delimit and establish higher categories.

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A REMARKABLE NEW SPECIES OF PERILITUS  
FROM MEXICO (HYMENOPTERA: BRACONIDAE)

BY C. F. W. MUESEBECK  
*United States National Museum*

For many years the collections of the National Museum have contained three male specimens of a strikingly distinct and undescribed species of the euphorine genus *Perilitus* Nees. These had been taken in 1908 at Cordoba, Vera Cruz, Mexico. Recently a female specimen of the same species, from nearby Orizaba in Vera Cruz, was received from N. L. H. Krauss. This specimen had been reared in October 1954 from a cocoon found in a burrow in the stem of *Lantana camara*. The genus *Perilitus* is best known from the common *P. coccinellae* (Schrank), a parasite of adult Coccinellidae that occurs in all the major zoo-geographical regions of the world. Other species, for which the host associations are known, likewise parasitize adults of Coleoptera, and presumably the host of the species described here is also a beetle.

*Perilitus eximius*, new species

This species is at once distinguished from all described species of *Perilitus* by its long, very slender and smooth abdominal petiole.

*Female*.—Length about 4.5 mm. Head not so strongly transverse as is usual in this genus; temple sloping gradually from eye; eye enormous, the malar space being virtually eliminated; face longer between antennae and clypeus than wide, smooth and shining; antennae considerably shorter than the body, 22-segmented in the type. Mesoscutum with notaulices sharply impressed and foveolate, and with a low but distinct and complete median keel; middle lobe of mesoscutum shallowly punctate anteriorly, coarsely punctato-rugulose posteriorly, and thinly but uniformly hairy; lateral lobes smooth and polished and largely hairless; disc of scutellum smooth and shining; propodeum completely strongly rugose, its dorsal face horizontal and fully as long as the posterior face which is vertical and broadly hollowed out medially; mesopleurum smooth and polished but with a broad, shallow, rugose, longitudinal impression below; metapleurum coarsely rugose; radial cell on wing margin distinctly longer than the stigma; recurrent vein interstitial with intercubitus; hind wing with nervellus straight and distinctly shorter than basal abscissa of basella; hind coxae smooth and polished. First abdominal segment strikingly slender, broadening a little

posteriorly but about five times as long as its apical width, entirely smooth and polished, its spiracles situated at the middle and very prominent; ovipositor sheath longer than hind tibia.

Piceous black; antennae brown; wings subhyaline; anterior and middle legs brownish yellow, their coxae and trochanters a little paler; hind legs with coxae and femora piceous, trochanters, tibiae and tarsi brownish.

*Male*.—Essentially like the female but with the eyes not quite so large, the wings clear hyaline and the antennae 24-segmented and about as long as the body.

*Type-locality*.—Orizaba, Vera Cruz, Mexico.

*Type*.—U. S. National Museum No.

Described from one female (type) and three male specimens, the males collected April 21, 1908 by A. Fenyes at Cordoba, Vera Cruz.

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FOUR NEW RACES OF BIRDS FROM EAST ASIA

BY H. G. DEIGNAN\*

Study of the bird collections made by the author in Thailand during 1952 and 1953, under a Fellowship of the John Simon Guggenheim Memorial Foundation, has led to the recognition of the following unnamed forms:

I.

The common dove of the Red Basin of Szechwan proves to be a well-marked race, separable from its relative of the maritime provinces of China by its saturate reddish coloration, similar to that that appears in so many birds of the same area. It may be called

*Streptopelia chinensis setzeri*, subsp. nov.

*Type*: U. S. Nat. Mus. No. 275893, adult female?, collected at Ipin [Suifu], Szechwan Province, China, on January 15, 1923, by David C. Graham.

*Diagnosis*: From *Str. ch. chinensis* of southeastern China separable by having the entire under parts Russet-Vinaceous (Ridgway) instead of Light Russet-Vinaceous (Ridgway), and the upper parts a deeper, slightly more rufescent, brown; from *Str. ch. vacillans* ("forresti") of southern Yunnan, and all other races except the nominate one, immediately separable by the complete absence of dark central streaks from the upper wing coverts.

*Range*: Lowland Szechwan and probably the adjacent areas of Kweichow; specimens from Shensi (south of the Tsinling Mountains) are intermediate between *setzeri* and *chinensis*.

*Remarks*: Thirteen specimens of *setzeri* have been compared with 30 of the nominate form. The new race is named for Henry W. Setzer, Division of Mammals, U. S. National Museum, who assisted me by examination of specimens of *Streptopelia* in the British Museum.

II.

The known range of *Centropus toulou* [*C. bengalensis* of authors] in the Indo-Chinese Peninsula is anomalous. Whereas in the French sphere and in Burma the species is thought to be generally distributed, in Thailand are found three populations apparently isolated from each other: the first, an uncommon winter visitor to the northern highlands and (at that season) always seen in eclipse plumage; the second, resident and common in the central plain, with adults always wearing nup-

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tial plumage in summer, eclipse plumage in winter; the third, resident and common in the Malay Peninsula from *ca.* lat. 8° N. southward, and possibly never reverting to an eclipse plumage when once adult. The peninsular form has long been recognized as inseparable from *C. t. javanensis* (Dumont); the northern visitant can only be *C. t. bengalensis* (of which *lignator* of southeastern China seems to be a synonym); the bird of the central plain has by some authors been called *javanensis*, by others *bengalensis*. Until recently pertinent material has been too scarce to permit of definitive identification, but through my own collecting and that of Robert E. Elbel a fine series of adults in nuptial dress is now available.

These show that the bird of central Thailand is in fact an unnamed race linking *bengalensis* with *javanensis*, and more distinct than any one of several of the accepted subspecies (which in some cases are founded upon no characters but those of size). I shall call it

***Centropus toulou chamnongi*, subsp. nov.**

*Type*: U. S. Nat. Mus. No. 450015, adult female (in nuptial plumage), collected at Ban Khlong Khlung [lat. 16°10' N., long. 99°45' E.], Kamphaeng Phet Province, Thailand, on April 16, 1953, by H. G. Deignan (original number 1560).

*Diagnosis*: From *C. t. bengalensis* separable by having the chestnut-rufous of the upper parts darker and duller, the scapularies distinctly nigrescent; from *C. t. javanensis*, by having the chestnut-rufous lighter and brighter, less nigrescent, and the hood highly glossed with steel blue and sharply demarcated from the remaining upper parts (as in *bengalensis*).

*Range*: Central Thailand and (apparently) southern Annam and Cochinchina.

*Remarks*: I agree with Grant and Mackworth-Praed (Bull. Brit. Orn. Club, vol. 59, 1939, pp. 50-51) that *C. bengalensis* is conspecific with *toulou* of Madagascar and Africa.

The new form is named in honor of Chamnong Thepphahatsadin, District Officer at Khlong Khlung, who rendered to my party unusual courtesies and assistance.

Both Stresemann (Nov. Zool., vol. 19, 1912, pp. 336-339) and Peters (Check-list of Birds of the World, vol. 4, 1940, p. 72) have listed *javanensis* as the form of all the Philippine Islands. I should place there the population of Palawan, but find that those of other islands are separable by having, in fresh plumage, increased nigrescence of the anterior upper parts, the black or blackish area usually extending to the center of the back. For Philippine birds the name *molkenboeri* Bonaparte, 1850, is available.

### III.

The great salty woodpecker of the middle third of the Mayal Peninsula has by some authors been called *harterti* (northwestern Burma), by others *pulverulentus* (Java). The population is in fact exactly and consistently intermediate in color between these two and might be called

***Mülleripicus pulverulentus celadinus*, subsp. nov.**

*Type*: U. S. Nat. Mus. No. 153742, adult male, collected at Ban Phra Muang [lat. 7°20' N., long. 99°30' E.], Trang Province, Thailand, on April 14, 1896, by William L. Abbott.

*Diagnosis:* The general tone of the slate-colored upper parts is distinctly paler (more bloomed) than the blackish slate of *pulverulentus*, but equally distinctly darker than the slate gray of *harterti*.

*Range:* Twelve specimens of *celadinus* have been seen from localities as far north as the Mergui District of southern Burma and as far south as the Siamese province of Trang.

*Remarks:* Specimens examined from Singapore and Johore agree with *pulverulentus* of Java and Borneo, and it is probable that the nominate race ranges throughout all but the northwestern Malay States and into Thailand in the provinces of Narathiwat, Yala, and Pattani. Skins from southwestern Thailand as far south as Prachuap Khiri Khan Province are inseparable from birds of northern Burma.

#### IV.

Recently collected material shows that one more form of the ruby-checked sunbird remains to be named from Thailand. I shall name it *Anthreptes singalensis internotus*, subsp. nov.

*Type:* U. S. Nat. Mus. No. 451383, adult male, collected at Ban Khlua Klang [ca. lat. 11°38' N., long. 99°36' E.], Prachuap Khiri Khan Province, Thailand, on December 25, 1952, by H. G. Deignan (original number 575).

*Diagnosis:* Belonging to that group of the races in which the ferruginous of the anterior under parts is not sharply defined from the yellow of the posterior under parts, *A. s. internotus* represents the expected link between *assamensis* of northern Thailand and *interpositus* of Thailand south of the Isthmus of Kra. The ferruginous of throat and upper breast is, in either sex, darker than in *assamensis*, paler than in *interpositus*, while the yellow of the remaining under parts is more greenish than in *assamensis*, more golden than in *interpositus*.

*Range:* Southwestern Thailand, from the headwaters of the river Mae Klong to the Isthmus of Kra; Tenasserim (Mergui District), probably north to the Tavoy District.

*Remarks:* Junge and Kooiman (Zool. Verh., No. 15, 1951, p. 36) refer three males of this population to *interpositus* after comparison with a series "from Pegu and Tenasserim." True *interpositus*, however, is restricted to the Malay Peninsula south of the Isthmus, and without examination of their material I cannot surmise which race or races actually lay before them.





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THE WISCONSIN PUMA

BY HARTLEY H. T. JACKSON

There are many records for the puma or cougar (*Felis concolor*) in Wisconsin, some of which have been assembled by W. E. Scott (Wisconsin Conserv. Bull. 4 (10): 25, 1939) and A. W. Schorger (Trans. Wisconsin Acad. Sciences, Arts and Letters 34: 31-32, 1942). Schorger also published an account of a mounted specimen in the collection of Lawrence College, Appleton, Wis. (Jour. Mammal. 19 (2): 252, May 14, 1938) which he later acquired for deposit in the University of Wisconsin Zoological Collection. The specimen was dismantled and made into a study skin with detached skull in 1948, at which time it was my privilege to examine it critically. A re-evaluation of measurements and other characteristics shows that this specimen represents an undescribed subspecies that inhabited the upper Mississippi Valley and western Great Lakes region. For permission to designate the specimen in the University of Wisconsin Zoological Collection as the type-specimen I thank Dr. John T. Emlen, Professor of Zoology at Wisconsin. The form is named for Dr. A. W. Schorger, Professor of Wildlife Management at the University, in recognition of his talent in salvaging specimens and historical records of extinct and vanishing species, collating the material, and making it available in publications.

*Felis concolor schorgeri*, subsp. nov.  
Wisconsin Puma

*Type-specimen*.—No. 13,464, University of Wisconsin Zoological Collection; ♂ (sexed by describer) adult, skin (removed from mount and tanned) and skull; collected November 22, 1857, by Samuel P. Hart.

*Type-locality*.—Near Appleton, Outagamie County, Wisconsin.

*Geographic range*.—Now extirpated. Formerly from west-central Kansas (Ellis County) east and northeast to eastern Wisconsin and Duluth, Minnesota; probably also throughout most of Missouri and Illinois.

*Diagnostic characters*.—A large and apparently rather dark and reddish puma, larger than *Felis concolor coryi* and possibly nearly as large as *F. c. hippolestes*, and apparently darker. Original color of type-specimen indeterminate, the specimen having been mounted and exposed

to light while on exhibition for about 90 years. Skull large, the cranium posteriorly relatively rather narrow in comparison with other subspecies; the spread of the zygomatic arches somewhat reduced posteriorly. Compared with the skull of *F. c. hipolestes* that of *F. c. schorgeri* is rather narrow, particularly posteriorly; much flatter and more dished in frontal region; zygomatic arch, particularly the malar part, broader; nasal breadth relatively and actually conspicuously greater; carnassial teeth, both upper and lower, larger. Compared with *Felis concolor coryi* the skull of *schorgeri* is somewhat larger and clearly approaches that of *coryi* only in the nasal breadth, which is even relatively greater in *schorgeri* than in *coryi*.

*Measurements*.—Type-specimen (adult male): No external measurements of the animal in the flesh are available. Prof. Walter E. Rogers, of Lawrence College, informed A. W. Schorger that the mounted specimen measured "27 inches in height at the shoulders and 85 inches in length from end of nose to tip of tail" (Schorger, Jour. Mammal. 19: 252, 1938). *Skull*: Type-specimen (adult male): Zygomatic width, 151.5 mm.; height of cranium, 73.8; interorbital breadth, 43.3; post-orbital processes (width), 75.6; width of nasals (at anterior tips of frontals), 22.6; width of palate (across interpterygoid fossa), 28.7; mixillary tooth row alveolar length, 65.0; upper carnassial crown length, 24.2; upper carnassial crown width, 13.2; lower carnassial crown length, 19.2; lower carnassial crown width, 15.2.

*Specimens examined*.—Kansas: Catherine, Ellis County, 1 (skull only, Kansas Univ. Mus.); Minnesota: Duluth, 1 (skull only, Amer. Mus. Nat. Hist.); Wisconsin: Appleton (near), 1 (type-specimen).

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STUDIES ON SPIROBOLOID MILLIPEDS. III. THE  
GENUS *SPIROBOLINUS* SILVESTRI

BY RICHARD L. HOFFMAN

The preceding two parts of this series\* have dealt with the rhinocricid genus *Eurhinocricus*, defining the genus on the basis of gonopod structure and giving a list of the known species. *Eurhinocricus* provided a good example of a group having come to include species entirely unrelated to the generotype; the present paper is concerned with a genus which, although adequately described, dropped into obscurity through the neglect of later workers, and which seems to be unknown to recent students of the group.

This is *Spirobolinus* of Silvestri, proposed in 1898 for two Ecuadorian species, and diagnosed in the following words (translated):

“Labrum tridentate. Mandibles pluripectinate. Labral pores 4—4. Antennae short. Collum laterally broad and not abbreviated. Pre-anal segment with a thickened elongate tail, exceeding the anal valves. Inner gonopods short.”

Although the preceding diagnosis is scarcely usable in itself, the two included species were well described in general, and the gonopods of the males were illustrated in fair detail. Brolemann, however, could not utilize the original descriptions in his classification of the spiroboloid millipeds, and wrote (1914: 5): “*Spirobolinus* Silvestri (1898, n), aucun rapprochement comparatif, les figures ne nous renseignent sur aucun des points essentiels.”

By 1926, nothing had been written in defense of the genus, and so *Spirobolinus* did not gain admission to Attems' treatment of the spiroboloids in the *Handbuch der Zoologie*, nor to Verhoeff's somewhat later (1932) summary of the group in Bronn's *Klassen und Ordnungen des Tierreichs*.

Fortunately, however, around the beginning of this century Silvestri and O. F. Cook exchanged a large number of paratypes of their milliped species, and it so happens in consequence that the United States National Museum has typical material of both *Spirobolinus luciae* and *S. nigrutilus*. Through the kindness of Dr. E. A. Chapin, I have been able to study these valuable specimens, and am pleased to be able to rescue this hapless genus from its undeserved sojourn into oblivion. It will be observed that the accompanying illustrations of *S. luciae* do not differ appreciably from Silvestri's drawings except in matters of small detail probably due to subjective errors of execution.

The paratype of *S. nigrutilus* in the National Museum is unfortunately

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\*Pt. 1. Proc. Biol. Soc. Washington, vol. 66, 1953, pp. 179-184.

Pt. 2. Proc. Biol. Soc. Washington, vol. 68, 1955, pp. —.

a female, and I can add nothing to the original description of that species.

Genus *SPIROBOLINUS* Silvestri

*Spirobolinus* Silvestri, 1898, Boll. Mus. Zool. Anat. comp. Univ. Torino, vol. 13, no. 324, p. 8 (proposed with two species).

*Type*.—*Spirobolinus luciae* Silvestri, by present designation.

*Diagnosis*.—A genus of the suborder Spirobolidea, characterized by the absence of pores from the 7th segment, and by the small posterior gonopods which apparently lack coxal elements. The pores appear to be located in the metazonite, but the segmental suture makes a wide loop caudad to pass behind and below the pore.

Small species, less than 30 mm long, segments smooth and unmodified, lacking scobinae. Labral pores 4 on each side; antennae with 4 sensory cones. Telson produced caudad and definitely surpassing the anal valves, latter of normal form without thickened margins. No tarsal pads in either sex. Anterior gonopods with well developed triangular sternite and slender, distally produced coxite elements. Posterior gonopods small, without sternite and apparently without coxites.

*Range*.—Ecuador.

*Species*.—Two.

*Spirobolinus luciae* Silvestri

Figs. 1-6

*Spirobolinus luciae* Silvestri, 1898, Boll. Mus. Zool. Anat. comp. Univ. Torino, vol. 13, no. 324, p. 8, figs. 1-4.

*Description*.—From adult male topoparatype (labeled Cotype by Silvestri), collected at Pun, Ecuador, by Enrico Festa.

About 30 mm long, 2.9 mm in diameter, with 44 segments.

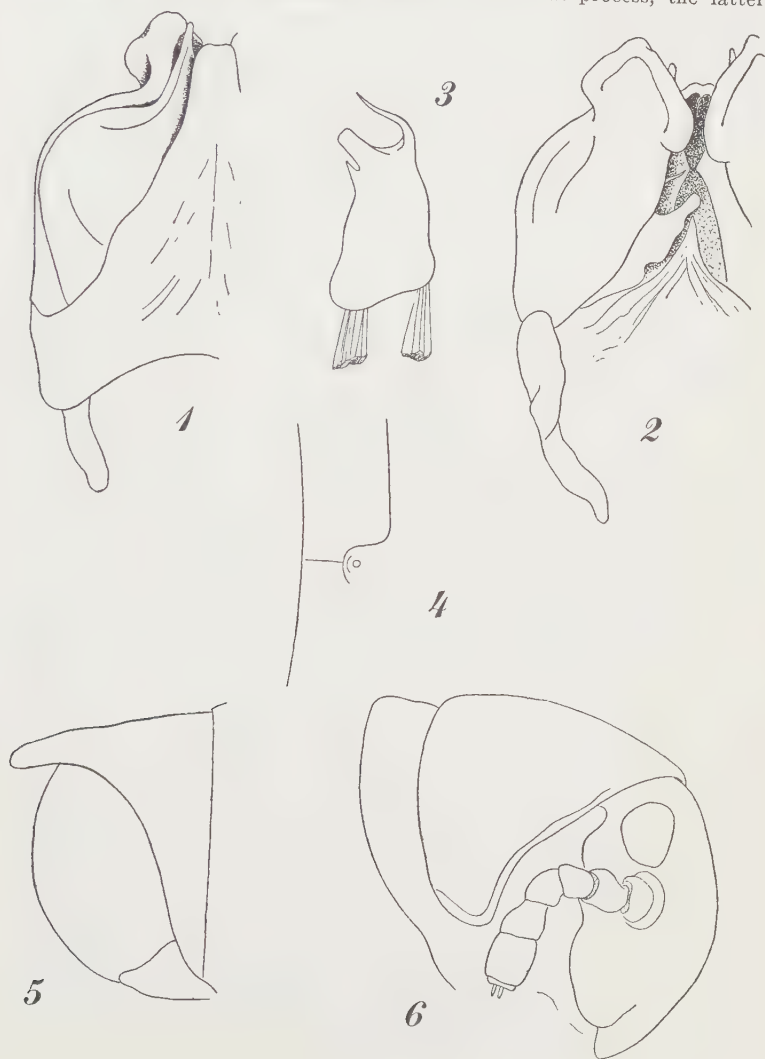
Color light brown, the dorsum paler, with a geminate middorsal stripe. In detail: yellowish brown or tan, somewhat darker on the sides below the pores and across dorsum of metazonites; each segment with a rectangular transverse black bar in front of the sulcus and a smaller spot in front of and behind it. Telson, front edge of collum, eyes, and a vertical frontal spot dark brown. Legs, antennae, and labral border yellowish.

Front of head smooth, clypeal pores 4—4; antennae short, not extending caudad past caudal edge of collum, the articles in decreasing order of length, 6-1-2-3-5-4-7; 4 terminal sensory cones; the proximal four articles almost glabrous. Mandibles rather deeply concave on their outer surface; sides of head below antennae immarginate. Eye patch small, rounded, about 25 ocelli in each cluster.

Collum smooth, narrowed somewhat toward the ends (fig. 6), its front edge with a marginal sulcus commencing just below level of eye patch. Second segment incurved ventrally, not as long as collum nor produced forward. Body segments smooth, with a distinct transverse sulcus across the dorsum but obsolete on the sides; the latter, especially of the prozonites, rather strongly striate near the legs; metazonites slightly raised above the level of the prozonites. Pores in a continuous series from the 6th to penultimate segment except that they are missing from the 7th; pores large and conspicuous, a small depression immediately caudad to each; pores well behind general level of the transverse sulcus which, however, is abruptly recurved caudad to pass behind them (fig. 4). No scobinae.

Telson smooth, without sulcus, produced into a depressed tail which considerably exceeds the anal valves (fig. 5), latter smooth and but slightly convex.

Male gonopods as illustrated (figs. 1 and 2). Sternal plate of anterior gonopods subtriangular, basally concave, distally exceeded by tips of both the coxites and telopodites, the latter considerably enlarged distally (fig. 2). Trachial stalks present, well sclerotized, firmly attached to base of sternite. Posterior gonopod small, flattened, without perceptible coxal joint and trachial stalk; distally modified into a long slender terminal process and a shorter, stouter subterminal process, the latter





subtended by a small tooth. Posterior gonopods concealed within the telopodite of the anterior pair, except for their tips (fig. 3).

Anterior legs of male without tarsal pads or other sexual modifications except that the coxae of the first few pairs are distally impressed or concave.

#### SYSTEMATIC POSITION

Having but one male specimen at my disposal, I am hesitant to make the step which will be necessary if my observations prove to be correct. That is, if the posterior gonopods actually consist of but a single piece, a new family will be required for the recognition of such a remarkable character. It is, of course, possible that a small coxal joint could have been broken off during dissection, although I made special efforts to prevent damage to the tiny appendage. But my drawing of this piece is quite similar to Silvestri's, and suggests that in fact the inner gonopod is fastened only by a band of muscle or ligament at each of its basal corners.

In other respects the genus appears similar to some of the Atopetholidae of western North America, although a large triangular sternal plate is almost a characteristic of the family Rhinoericidae.

There is a possible junior synonym, in the form of Loomis's genus *Aporobolus* (1934), based upon a species from the island of Tobago. This species also lacks pores on the 7th segment, and has gonopods of the sort found in *Spirobolinus*. But until more material of both groups is at hand for comparison I think it best to keep them separate. Often a perfectly good name will become "lost" after unwarranted relegation to synonymy.

The classification of the spiroboloids is increasingly becoming incomprehensible through the proposals of new genera which are not compared by their authors with related established genera, and many founded upon mistaken concepts of anatomy. In the hope of abating the confusion I have begun to assemble materials for a revision of the order and hope to present in the near future an account of the genera so far erected and their type species.

Finally, it is some interest to observe that Silvestri overlooked the absence of pores from the 7th segment, since he normally placed great taxonomic significance to the distribution of the pore series, and separated more than a few spirostreptoid genera chiefly on such a basis.

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#### Explanation of Plate

Fig. 1. Left side of anterior gonopods, cephalic aspect. 2. Right side of anterior gonopods, caudal aspect, showing the largely concealed posterior gonopod. 3. Left posterior gonopod. 4. Repugnatorial pore on right side of body, showing position of segmental sutures. 5. Lateral aspect of caudal end of body, from right side of body. 6. Outline sketch of head capsule, antenna, and collum.



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THE TYPE LOCALITY OF *HYLA TRISERIATA* WIED

BY FRANCIS HARPER

The original description of this chorus frog (currently known as *Pseudacris nigrita triseriata*) occurs in the classic work of Maximilian Prinz zu Wied (1839, 1:249). The type locality has customarily been recorded as Mt. Vernon, Ohio River, Indiana. This is situated in Posey County, in the extreme southwestern corner of the state. I am not aware of any particular discussion of the type locality except that by Smith and Smith (1952: 176): "The exact spot visited by Wied . . . could not be determined from his narrative. Since he traveled by boat the type specimen, presumably, was collected in the Ohio River bottom-lands."

There is considerably more, however, to be said on the subject. In the original work (1839: 217) the author writes of leaving New Harmony (on the Wabash River, about a dozen miles north of Mt. Vernon) by horseback early in the morning on March 16, 1833, traveling overland, crossing Rush Creek and Big Creek, and reaching Mt. Vernon by mid-day. Meanwhile,

"In the woodland pools and little sloughs of the recesses between the hills we heard the trilling of a small greenish-gray hylid, which does not seem to occur in Pennsylvania. As soon as one approached the pools, the little animals betook themselves into the mud and roiled the water. If one withdrew, their united voices were audible at quite a distance." (Translated from the original German.)

These remarks are introduced between the crossings of Rush Creek and Big Creek. The detailed description, with proposal of the name *Hyla triseriata*, follows on pages 249-250. In a much later publication (1865: 118) Maximilian states that the species was found first in the woodland pools and sloughs near New Harmony, later at Mt. Vernon on the Ohio, and on the Mississippi. The voice was heard by 9 a.m. The specimens were subsequently lost; consequently no type is extant.

The above quotations from Maximilian's narrative seem to furnish sufficient grounds for restricting the type locality to the area between Rush Creek and Big Creek, along the route from New Harmony to Mt. Vernon, in Posey County, Indiana (New Harmony quadrangle, 1903, U. S. Geol. Survey).

The advantage of such a course becomes apparant from the following remarks by Smith and Smith (1952: 176), who wrote under the impression that Mt. Vernon is the proper type locality:

"Six topotypes [from Mt. Vernon] collected by us are intergrades [between *feriarum* and *triseriata*] but show closer affinities to *feriarum*. . . .

"A much more adequate sample (36 specimens) was obtained four miles south of New Harmony (still in Posey County but out of the river valley) and this consists of definite intergrades which do approach *triseriata* more closely than *feriarum* in the character of leg length and dorsal pattern."

Thus, by restricting the type locality to the near vicinity of New Harmony, we may avoid all the nomenclatural confusion that would result from relegating *Helocaetes feriarum* Baird (1854) to the synonymy of *Hyla triseriata* Wied (1839) and at the same time applying some different name to the subspecies that has long been known as *triseriata*. *Pseudacris nigrata feriarum* (Baird) may therefore remain as the name of the more eastern subspecies, ranging, according to Smith and Smith (1952: 174, fig. 2), from New Jersey and Pennsylvania southwestward to Texas.

Since Rush Creek is approximately 4 miles south of New Harmony, the 36 specimens mentioned above (Smith and Smith, 1952: 176) may be regarded as virtual topotypes of *triseriata*.

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PROCEEDINGS  
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THE DIAMONDBACK TERRAPINS (*MALACLEMYS*  
*TERRAPIN*) OF PENINSULAR FLORIDA

BY ALBERT SCHWARTZ

*The Charleston Museum, Charleston, S. C.*

As presently understood, three subspecies of diamondback terrapins (*Malaclemys terrapin*) inhabit the coastal waters of the Florida Peninsula and the Florida Keys. As mapped by Carr (1952: 164) the ranges of these three forms are: *Malaclemys t. macrospilota*, Florida west coast; *Malaclemys t. centrata*, Florida east coast, south to about Palm Beach County; *Malaclemys t. rhizophorarum*, Florida Keys, integrading with *M. t. centrata* along the southeastern coast and with *M. t. macrospilota* in the region of Cape Sable.

Recent acquisition of fresh material from the Florida east coast and the coast of South Carolina indicates that the status of the diamondback turtles from the former locality is not as Carr indicated. In addition to material in the collection of the Charleston Museum, I have examined specimens from various institutions, and wish to extend my thanks for the loan of turtles to the following curators of collections: Charles M. Bogert and Richard G. Zweifel, American Museum of Natural History (AMNH); Arthur Loveridge, Museum of Comparative Zoology (MCZ); Archie F. Carr and Duke Wilder, University of Florida (UF); Norman E. Hartweg and William E. Duellman, Museum of Zoology, University of Michigan (UMMZ), and Doris M. Cochran, United States National Museum (USNM). Numerous persons have aided in the collection of specimens of *Malaclemys*, and I wish to thank L. Neil Bell, Julian R. Harrison III, Raymond P. Porter, John A. Quinby, and Ephie C. Seabrook for their assistance. Shell measurements follow Carr (1952), and all measurements are in millimeters.

*Malaclemys t. rhizophorarum* was described by Fowler (1906) as *Malaclemmys littoralis rhizophorarum*, from a single specimen taken at Boca Grande Key, Monroe County, Florida. Boca Grande lies between Key West and the Marquesas. Carr (1946) resurrected the name *rhizophorarum*, after many years of disuse, for the diamondback terrapins of the Florida Keys, on the basis of a new specimen from Card Sound, Dade County, Florida, and the examination of turtles from the lower portion of the Florida Peninsula. *Malaclemys t. macrospilota* was described by Hay in 1905, from material taken at Charlotte Harbor, Florida, and the Florida West Coast; this Gulf Coast subspecies is readily separable from the Atlantic Coast material by virtue of the clear and sharply differentiated centers of the carapace laminae. *Malaclemys*

*t. centrata* was first described from Carolina by Latreille in 1801, and later the type locality was restricted to Charleston, South Carolina, by Hay (1905:6).

Examination of specimens from the east coast of Florida demonstrates that this region is inhabited by turtles which cannot be assigned to any of the named subspecies of *Malaclemys terrapin*. The Florida east coast areas were in the past the home of the Tequesta Indians and it seems appropriate to name the new subspecies after these early Americans for whom, almost certainly, the diamondback terrapin was an item of diet. The new subspecies may be known as

***Malaclemys terrapin tequesta*, new sub species**

*Holotype*: UMMZ 108482, an adult female from Miami Beach, Dade County, Florida, taken June, 1953, by Donald de Sylva.

*Paratypes*: All from Florida, as follows: *Volusia Co.*, New Smyrna, (USNM 37020) Daytona Beach (UF 4242); *Brevard Co.*, ½ mi. E junction Florida AIA and Florida 520 (UF 6589, UF 6590), 1.3 mi. E Merritt Island (UMMZ 106149, UMMZ 106150), 2 mi. E Merritt Island (UMMZ 106148), 5 mi. E Merritt Island (UMMZ 106151), 5.2 mi. E Merritt Island (UMMZ 106147), Eau Gallie (MCZ 20287); *Indian River Co.*, Sebastian (MCZ 48787).

*Diagnosis*: A diamondback turtle without strikingly differentiated trans-eucut centers or a pattern of concentric circles on the carapace laminae, and without black edging on the seams of the ventral surface of the marginal laminae. Carapace slightly keeled, broad, flattened, and horn-colored, occasionally carapace laminae cleared to show remnants of juvenile pattern; plastron either immaculate or with various dark patterns, either seam following, radiating from the posterior corner of the plastral laminae, or consisting of rectangular black hollow figures on each plastral lamina. Ventral surface of marginal laminae at level of bridge usually without a continuation of the dorsal pattern or with this pattern very obscure and poorly defined, and with a black blotch at the posterodorsal corner of the ventral surface of the marginals at the level of the bridge. Head skin variously mottled or stippled with dark gray on light gray background, but never with dark spots fused into lines. Juveniles usually without concentric rings on carapace laminae and dorsal surface of marginals, rarely with no more than two concentric rings on each lamina; usually each carapace and marginal lamina stippled with gray; if present, one (usually) to five (rarely) dark spots in the center of each lamina. Dorsal tubercles bulbous and either light or dark, that on central lamina 4 most pronounced. Plastron either uniformly lightly stippled with gray, or with each plastral lamina containing a square or triangular hollow dark figure which follows the configuration of the lamina but does not touch the seams.

*Distribution*: The east coast of the Florida Peninsula, from at least Volusia County south to Dade County.

*Description of holotype*: An adult female with the following measurements: Carapace length, 178; length of plastron, 157; length of anterior lobe of plastron, 41.0; length of middle lobe of plastron, 53.1; length

of posterior lobe of plastron, 63.2; head width, 37.2; depth, 72; width of posterior lobe of plastron, 82.8; width of bridge, 48.5; greatest width of carapace (at marginal 7), 139.

The carapace is generally dark or horn-colored, the central laminae uniformly so. Each lateral lamina is lighter centrally, and one to several heavy brown spots are visible through the lighter center. The marginals are lighter than the laterals and a bold, open-sided square figure is visible on the dorsal surface of each marginal. The plastron is yellow and the central seam is widely bordered with dark radiating lines. Each plastral lamina shows the remnants of the triangular or rectangular hollow figure noted above as occurring in juveniles, and these plastral figures are somewhat obscured by additional dark pigment. The ventral surfaces of the marginal laminae show a hollow, poorly defined C-shaped figure, the open side directed dorsally, and marginals 4 to 9 on each side have a brown blotch on the posterodorsal corner. The head skin is light gray and boldly spotted with black. The nasal shield is heavily stippled with black, and a black border occurs along its posterior third. The neck and fore limbs are light gray, spotted with black, while the hind limbs and rump are almost uniformly gray. *Variation*: The eleven adult specimens of *M. t. tequesta* (ten females and one male) show little variation compared to the holotype. All are broad and flattened, when compared to *M. t. centrata*, and all have the horn-colored carapace of the type. None shows any indication of the concentric circles on the carapace laminae, persistently characteristic in *M. t. centrata*, and three females (UF 6589, UF 4242, UMMZ 106151) have the centers of the carapace laminae somewhat lighter, so that the remnants of the juvenile pattern (incomplete or diffuse circle or large brown dots) are still visible. All except two (UF 6589, UF 4242) have the dark blotch on the ventral surface of the marginals at the level of the bridge. The head skin is gray and either lightly and uniformly stippled, or with dark spots; the nasal shield varies from pale gray and immaculate, to solid black. The dorsal keels are but slightly tuberculate; the single male (MCZ 48787) has the keel on central 4 more bulbous than those on the preceding two centrals, and likewise more bulbous than the keels of any of the females.

The outline of the shell of *M. t. tequesta* is more nearly oval than that of the remaining Floridian subspecies, and the carapace laminae show conspicuous concentric grooves.

*Comparisons*: *Malaclemys t. tequesta* requires comparison with the three Floridian subspecies of the genus. The new form can easily be distinguished from *M. t. macrospilota* since the latter has translucent yellowish areas in the centers of the carapace laminae. *M. t. tequesta* shows occasional lightening of the carapace lamina but it is never so pronounced as in *M. t. macrospilota* and the clear areas are not so abruptly differentiated in the new subspecies, the transition between the horn-colored peripheries and the clear centers being very gradual. *M. t. tequesta* is also a broader and flatter turtle than *M. t. macrospilota*, and has a more oval outline than the west coast subspecies. Juveniles of *M. t. macrospilota* differ from those of *M. t. tequesta* in that the carapace laminae of the former subspecies are usually heavily spotted with black and each lamina is heavily black bordered. Concentric



rings are absent on the lateral and central laminae on juvenile *M. t. macrospilota*. If the heavy spotting is absent on the lateral laminae of *M. t. macrospilota*, there is usually a single prominent black spot in the center of each lateral lamina. The bulbous keels on the centrals of juvenile *M. t. macrospilota* are somewhat more pronounced than those of *M. t. tequesta*.

From *M. t. centrata*, *M. t. tequesta* differs in the absence of dark greenish or gray concentric rings on the light gray or green carapace laminae, and the presence of a dark blotch on the ventral surface of the marginal laminae at the level of the bridge. In *M. t. centrata*, the pattern of the dorsal surface of each marginal lamina continues onto the ventral surface of the same lamina as a square or rectangular figure. In *M. t. tequesta*, such ventral continuation of the marginal lamina pattern is either completely absent or is but faintly indicated. The juveniles of these two subspecies are easily differentiated. Juvenile *M. t. centrata* have three or more concentric rings in each lateral lamina, and a complex figure consisting of a combination of stippling and lines and/or rings on each central. The continuation of the marginal pattern from the dorsal to the ventral surface of each marginal lamina, noted in adult *M. t. centrata*, is even more conspicuous in juveniles. In juvenile *M. t. tequesta*, there are never more than two concentric rings in each carapace lamina, and these are poorly defined and occur in only five of sixteen juveniles. The bulbous keels of the centrals are very pronounced in juvenile *M. t. tequesta*, while the keels of juvenile *M. t. centrata* are not bulbous but are rather a linear, almost parallel sided, series. Carr (1952:175) shows an excellent photograph of hatching *M. t. centrata* from Beaufort, North Carolina, and a series of twelve hatchlings from South Carolina and Savannah, Georgia, agree well with his photograph. The expansion of the keels in hatchling *M. t. tequesta* is reminiscent of the same condition in juvenile *M. t. macrospilota*.

There are four specimens of *Malaclemys* (other than the type of *M. t. rhizophorarum* from the Florida Keys available to me. One of these (USNM 37021, adult female, Key West) is typical of *M. t. macrospilota*. This individual was taken many years ago and, since it does not agree with the remaining three specimens from the Florida Keys, it is suspected that this individual was captured by commercial fishermen along the lower west coast of Florida and brought to Key West, where it was purchased and later deposited in the United States National Museum. The remaining three specimens (MCZ 1848, adult female, MCZ 1849, adult male, both from the Marquesas, Monroe County, Florida; AMNH 4745, juvenile, from Planters, Key Long, Monroe County, Florida) differ in detail from *M. t. tequesta* and *M. t. macrospilota*, and are considered to represent *M. t. rhizophorarum*. I am unable to locate 'Planters, Key Long' on any map; however, there has been, near the present site of the town of Tavernier, a settlement of Planter on Key Largo, and I suspect that the juvenile is really from this locality rather than 'Planters, Key Long'.

Compared with the figure of *M. t. rhizophorarum* (Fowler, 1906), the two adults from the Marquesas show the black edging on the ventral surface of the marginal laminae (which Fowler considered diagnostic



of *M. t. rhizophorarum*) and the black pigmentation radiating from the plastral seams. This condition occurs in *M. t. macrospilota*, as demonstrated in three adult females (UMMZ 104023, 109544, 109545) from Cedar Key, Levy County, Florida. However, no other specimen shows the fusion of dark spots on the head, giving the head a boldly streaked appearance, as do the two adults from the Marquesas. The juvenile from Key Largo shows the same head pattern condition, and the carapace is also very distinctly marked. Each lateral lamina has a bold, broad, doughnut-shaped figure, hollow on laterals 1 to 3, and solid on lateral 4. Central 1 has a W-shaped black figure, the open end directed anteriorly. The precentral and marginals 1 to 7 have a solid black blotch on the dorsal surfaces, while marginals 8 to 11 have a bold, C-shaped figure, the open end directed toward the periphery of the shell. Centrals 2 to 4 have each a dark bulbous keel, crossed by a black bar. The plastral laminae are boldly spotted, with one to four spots on each lamina. The lateral ends of the pectoral and abdominal laminae each have a large black spot, and the ventral surface of each marginal likewise is marked with a black spot. These markings on the juvenile from Key Largo differ radically from those of any other juvenile examined, and, if characteristic of the populations of *Malaclemys* from the Florida Keys, are sufficiently distinct to separate the key juveniles from those of the mainland. Detailed comparison of this juvenile *M. t. rhizophorarum* with those of *M. t. centrata*, *M. t. macrospilota*, or *M. t. tequesta* is unnecessary. Adult *M. t. rhizophorarum* can be distinguished from *M. t. tequesta* by the fused and bold head spots, the absence of a dark spot on the ventral surface of the marginal laminae, and the presence of black borders on the ventral surface of the marginals. From *M. t. macrospilota*, the key turtles may be distinguished by the head markings and by the absence of clear centers of the carapace laminae. Much additional fresh material is needed before adequate assessment of the differentiating characters of *M. t. rhizophorarum* can be made. For the present it seems preferable to regard the mangrove terrapin as a distinct subspecies.

Inspection of Table 1 shows that female *M. t. tequesta* average larger in measurements of carapace length, anterior lobe length, posterior length, posterior lobe width, depth, and carapace width; the differences are not striking, however. The ratio of depth over length of posterior lobe of plastron will separate most female specimens of *M. t. centrata* from female *M. t. tequesta*; only two individuals (out of 20) of the former subspecies have this ratio in excess of 1.07, while this ratio in *M. t. tequesta* ranges between 1.07 and 1.19. Likewise, only six specimens of *M. t. centrata* have the ratio of carapace width over posterior lobe length greater than 1.99, while this ratio in *M. t. tequesta* ranges between 1.99 and 2.26. The ratio of depth over posterior lobe length averages equally in female *M. t. tequesta* and female *M. t. macrospilota*, and the ratio of carapace width over posterior lobe length averages less in *M. t. macrospilota* than in *M. t. tequesta*, although the extremes are identical.

Adequate series of males of the Floridian races of *Malaclemys terrapin*, as well as *M. t. centrata*, are not available for comparison.

I have examined nine male *M. t. macrospilota*, three male *M. t. centrata*, and one male each of *M. t. tequesta* and *M. t. rhizophorarum*. On the basis of this limited material, the following observations can be made. Male *M. t. macrospilota* have the light centers of the carapace laminae typical of this race, but old individuals may have this character obscured. In young males the carapace keel is bulbous, especially on centrals 3 and 4, but older individuals have the bulbous terminations less prominent and worn. *M. t. centrata* males show the dark gray or green concentric circles on the carapace laminae and the keel of the carapace is not bulbous, but rather a series of rather sharp carinae occur on centrals 2 to 4, with the keel on central 4 most pronounced. The single male *M. t. tequesta* is almost uniformly horn-colored dorsally, with the lateral laminae only slightly translucent. The dorsal keel is bulbous (especially on centrals 3 and 4), but not so prominent as in male *M. t. macrospilota*. The ventral surface of the marginals at the bridge level have the customary brown blotch typical of the subspecies. The male *M. t. rhizophorarum* is quite dark (almost black) above, and the central keel of the carapace is bulbous on centrals 2 and 4, but less pronounced than in *M. t. macrospilota* and *M. t. tequesta*. The ventral surface of the marginals shows the typical black seams, and the head shows the fusion of blotches characteristic of this subspecies. Measurements and proportions are shown in Table 2. From these data it appears that *M. t. macrospilota* males average larger than those of the three southeastern subspecies, and that male *M. t. centrata* can be separated from male *M. t. macrospilota* on the basis of the ratio of carapace width over length of posterior lobe of plastron. The single male *M. t. rhizophorarum* has a higher ratio of carapace width over length of posterior lobe of plastron than any other male examined, and additional specimens from the Florida Keys may indicate that this ratio will separate key specimens from the remaining Floridian subspecies.

The areas of intergradation between *M. t. tequesta* and *M. t. rhizophorarum* to the south, and between the former subspecies and *M. t. centrata* to the north are unknown. Intergrades between *M. t. tequesta* and *M. t. rhizophorarum* might be expected on the southern coast of Florida and upon the Upper Keys. Carr's (1952:178) specimen from Card Sound, Dade County, may be an intergrade or, judging from the blotchy head markings, may represent *M. t. rhizophorarum*. Determination cannot be made from the photograph, and the specimen cannot presently be located. *M. t. tequesta* is known from Volusia County, Florida and *M. t. centrata* occurs as far south as Glynn County, Georgia. Intergrades between these two forms are expected in the intervening area. Johnson (1952:100) reported a specimen of *M. t. rhizophorarum* from Key Island, south of Naples, Collier County, Florida. I have not examined this individual, but on geographic grounds it would be expected to be referable to *M. t. macrospilota*. Johnson's comment that his specimen represents an immigrant *M. t. rhizophorarum* into an otherwise pure population of *M. t. macrospilota* is a possibility. *Specimens examined* (except paratypes of *M. t. tequesta*)—*M. t. centrata*: South Carolina, Charleston Co., nr. Charleston, 1; Cooper River, North Charles, 1; Charleston, 4; Morris Island, 8; Sol Legare Flats, 7.7

mi. SSW Charleston, 4; Stono River, Edgewater Park 1; Folly Island, 6; Clark's Sound, James Island, 2; Clark's Sound, Folly River, 3; Edisto Island, 1; *Beaufort Co.*, Parris Island, 1. *Georgia, Chatham Co.*, Savannah, 3; *Glynn Co.*, no other locality, 6. *M. t. tequesta: Florida, Brevard Co.*, nr. Melbourne, 2; nr. Merritt Island, 14. *M. t. rhizophorarum: Florida, Monroe Co.*, Planter, Key Largo, 1; Marquesas, 2. *M. t. macrospilota: Florida*, between *Dixie* and *Levy cos.*, mouth of Suwannee River, 12; *Levy Co.*, Cedar Key, 7; *Pinellas Co.*, Passagrille, 1; Gulfport, 3; *Hillsborough Co.*, no other locality, 1; *Manatee Co.*, Bradenton, 1; *Collier Co.*, Marco Island, 4; 3.3 mi. SW Royal Palm Hammock State Park, 1; *Monroe Co.*, Key West (?), 1.

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TABLE 1.

|                       | 20 <i>M. t. centrata</i> | 11 <i>M. t. tequesta</i> | 15 <i>M. t. macrospilota</i> | 1 <i>M. t. rhizophorarum</i> |
|-----------------------|--------------------------|--------------------------|------------------------------|------------------------------|
| Carapace length       | 170.0 (140-192)          | 180.4 (161-200)          | 178.7 (167-194)              | 172                          |
| Plastral length       | 153.2 (125-176)          | 160.5 (144-179)          | 160.7 (134-177)              | 155                          |
| Anterior lobe length  | 38.1 (32.8-43.4)         | 43.5 (37.5-48.9)         | 40.7 (32.5-44.8)             | 42.6                         |
| Middle lobe length    | 50.7 (41.1-61.3)         | 53.0 (44.7-61.1)         | 55.2 (43.5-64.4)             | 54.1                         |
| Posterior lobe length | 63.5 (50.9-74.8)         | 64.3 (57.9-72.6)         | 64.1 (55.1-70.0)             | 57.8                         |
| Head width            | 34.7 (28.4-42.0)         | 35.4 (32.6-38.6)         | 36.2 (30.0-39.5)             | 32.0                         |
| Depth                 | 64.4 (56-75)             | 72.2 (64-80)             | 72.0 (59-82)                 | 68                           |
| Width posterior lobe  | 81.1 (69.5-90.2)         | 84.7 (70.5-94.2)         | 82.4 (71.5-89.7)             | 73.4                         |
| Width bridge          | 46.2 (37.9-54.4)         | 50.6 (44.1-57.0)         | 52.9 (41.0-58.7)             | 51.7                         |
| Carapace width        | 124.3 (111-141)          | 137.0 (119-152)          | 134.4 (110-145)              | 122.2                        |
| D/PLL                 | 1.02 (.92-1.16)          | 1.12 (1.07-1.19)         | 1.12 (.99-1.23)              | 1.18                         |
| CW/PLL                | 1.99 (1.81-2.33)         | 2.13 (1.99-2.26)         | 2.09 (1.99-2.23)             | 2.11                         |

Table 1. Measurements and ratios (means and extremes) of female specimens of four subspecies of *Malaclemmys terrapin*. Abbreviations: D, depth; CW, carapace width; PLL, length of posterior lobe of plastron.

TABLE 2.

|                       | 3 <i>M. t. centrata</i> | 1 <i>M. t. tequesta</i> | 9 <i>M. t. macrospilota</i> | 1 <i>M. t. rhizophorarum</i> |
|-----------------------|-------------------------|-------------------------|-----------------------------|------------------------------|
| Carapace length       | 120.1 (112.8-128.6)     | 119.4                   | 128.0 (109.4-143.9)         | 117.0                        |
| Pastral length        | 102.4 (91.4-110.1)      | 99.4                    | 110.7 (93.9-122.7)          | 97.7                         |
| Anterior lobe length  | 25.9 (24.0-27.3)        | 26.0                    | 28.8 (23.7-31.6)            | 27.0                         |
| Middle lobe length    | 33.4 (29.8-37.1)        | 30.5                    | 37.0 (30.6-50.2)            | 32.1                         |
| Posterior lobe length | 43.9 (37.8-47.3)        | 42.7                    | 45.4 (39.0-50.2)            | 38.4                         |
| Head width            | 21.7 (20.7-23.0)        | 21.6                    | 23.6 (20.6-27.1)            | 20.5                         |
| Depth                 | 43.7 (42-46)            | 45                      | 47.3 (41-53)                | 40                           |
| Width posterior lobe  | 53.9 (50.0-57.2)        | 50.0                    | 57.6 (49.7-64.4)            | 49.6                         |
| Width bridge          | 30.0 (25.7-33.2)        | 28.4                    | 35.4 (29.9-40.3)            | 33.8                         |
| Carapace width        | 87.4 (77.0-93.1)        | 92.8                    | 95.2 (82.9-107.0)           | 87.0                         |
| D/PLL                 | 1.00 (.91-1.10)         | 1.05                    | 1.04 (.94-1.11)             | 1.04                         |
| CW/PLL                | 1.99 (1.97-2.04)        | 2.17                    | 2.10 (2.05-2.17)            | 2.27                         |

Table 2. Measurements and ratios (means and extremes) of male specimens of four subspecies of *Malaclemys terrapin*. Abbreviations in Table 1.

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A NEW SPECIES OF BAT (GENUS *MYOTIS*) FROM  
COAHUILA, MÉXICO

BY ROLLIN H. BAKER

On the evening of June 24, 1952, Albert A. Alcorn shot a small bat as it circled over a water-filled earthen tank situated in an open, intermontane valley near Bella Unión, Coahuila. This unique bat belongs to the genus *Myotis* but owing to its small size and flattened skull is not assignable to any known species of this genus; the bat is named and described as follows:

***Myotis planiceps* new species**

*Type*.—Male, adult, skin and skull, No. 48242, Univ. Kansas Mus. Nat. Hist.; 7 mi. S and 4 mi. E Bella Unión, 7200 ft., Coahuila; 24 June 1952; obtained by Albert A. Alcorn, original number 920.

*Distribution*.—Known only from the type locality.

*Diagnosis*.—Size small for the genus, forearm distinctively short (see measurements); ears and membranes dark; pelage glossy and long (maximum length of hairs on middle of back, 8.2 mm.), hairs of upper parts basally dark and tipped with (*j* 16) Cinnamon-Brown (capitalized color term is that of Ridgway, Color Standards and Color Nomenclature, Washington, D. C., 1912), hairs of underparts basally black and tipped with buffy; skull small and flattened (see figure 1), rostrum narrowing anteriorly; teeth small; first and second premolars, both above and below, when viewed from occlusal surfaces, approximately the same size and uncrowded.

*Comparisons*.—*Myotis planiceps* is distinguished from all other North American *Myotis* by its short forearm, greatly flattened cranium and small teeth. Superficially, *M. planiceps* bears some resemblance to the three species, *Myotis californicus* (Audubon and Bachman), *Myotis subulatus* (Say) and *Myotis lucifugus* (LeConte), but differs from them in the above respects and also in having smaller ears, a more pointed rostrum and the occlusal surfaces of the 1st and 2nd premolars, both upper and lower, more nearly equal. From *M. californicus*, *M. planiceps* differs also in having more prominent metalophs and hypocones on the first and second upper molars. From *M. subulatus*, *M. planiceps* differs also in having more prominent metalophs and protoconules on the first and second upper molars and in having the crown of the third upper molar more shortened anteroposteriorly with no hypocone. From *M. lucifugus*, *M. planiceps* differs also in having a smaller hind foot, a slight keel on the calcar, less developed metalophs and hypocones on the first and second upper molars, and crown of the third upper molar more shortened anteroposteriorly with no hypocone and metaconule.



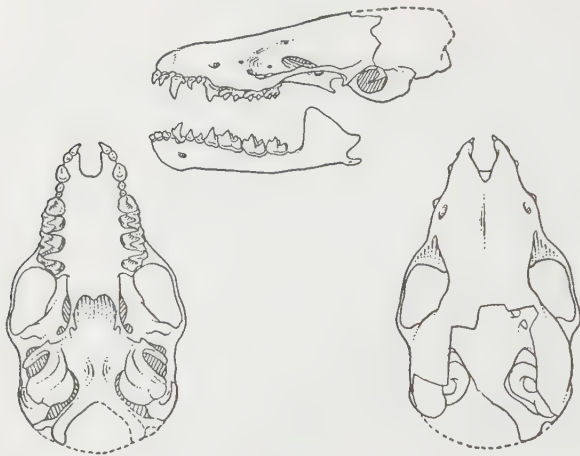


Fig. 1. *Myotis planiceps*, No. 48242, Univ. Kansas Mus. Nat. Hist., holotype. From left to right, ventral, lateral with lower jaw, and dorsal views of skull. All X3.

*Remarks.*—Probably *M. planiceps* is more closely allied to *M. californicus* than to any other *Myotis*. The cranium of *M. planiceps* is much more flattened than in *M. subulatus*. This flatness in *M. planiceps* is easily seen even though the hindmost part of the braincase is gone (see fig. 1). The occlusal surface of the upper molariform teeth is small in comparison with the area of the palatal surface. The distance across the third upper molars, from the outer side of one tooth to the outer side of the other, is 4.9, and the space across the palate between the inner borders of these two teeth measures 2.5.

This one bat was taken at 7200 feet elevation in a heavily grazed valley surrounded by higher mountains covered with boreal forests. It is suspected that this species lives in montane areas.

*Measurements.*—Measurements, in millimeters, of the holotype are: total length, 76; length of tail vertebrae, 25; length of hind foot, 8; height of ear from notch, 10; length of forearm, 26.5; length of thumb, 3.8; length of third metacarpal, 24.3; length of fifth metacarpal, 23.3; condylobasal length of skull, 13.3; zygomatic breadth, 8.1; least inter-orbital constriction, 3.4; breadth of braincase, 7.1; mastoid breadth, 7.2; palatal length, 6.7; maxillary breadth, across M3, 4.9; length of mandible, 7.3; length of maxillary tooth-row, 4.9; length of mandibular tooth-row, 6.2.

*Specimen examined.*—One, from the type locality.

*Transmitted June 8, 1955.*



PROCEEDINGS  
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THREE NEW RODENTS OF THE GENERA *MICROMYS*  
AND *APODEMUS* FROM KOREA

BY DAVID H. JOHNSON<sup>1</sup> AND J. KNOX JONES, JR.<sup>2</sup>

The study of a collection of mammals from southern Korea and Cheju Do (Quelpart Island) has revealed the existence there of three new murine rodents, one in the genus *Micromys* and two in the genus *Apodemus*.

A systematic study of Korean mammals is being conducted at the United States National Museum in cooperation with the Commission on Hemorrhagic Fever of the Armed Forces Epidemiological Board and the Army Medical Service Graduate School. This paper represents the first contribution from the cooperative venture.

All measurements are in millimeters. Basal length was taken from the anterior inferior border of the foramen magnum to the anteriormost point on the incisors. Capitalized color terms are from Ridgway (1912).

***Micromys minutus hertigi*, new subspecies**

*Type*.—Adult female in summer pelage, skin and skull, United States National Museum no. 299104, from 2 miles southeast of Mosulp'o, 3 meters, Cheju Do (Quelpart Island), Korea; obtained 11 September 1954 by Warren D. Thomas, original no. 1675 of J. Knox Jones, Jr.

*Distribution*.—Known only from the type locality.

*Diagnosis*.—Upper parts bright ochraceous; skull large; nasals long, slender and tapering posteriorly; zygomatic notch deep.

*Description*.—Size: Large for species (see measurements); tail longer than head and body. Color: Upper parts (summer pelage) uniformly bright ochraceous (between Ochraceous-Tawny and Ochraceous-Orange), finely lined with black hairs; flanks slightly paler in color, bases of hairs gray; lateral line near Ochraceous-Buff; underparts white; feet pale yellow above, slightly darker below; ears essentially same as dorsum; tail sparsely haired and bicolor, dark above, pale yellowish below; vibrissae black. Skull: Large, massive and relatively narrow (see measurements); nasals long, slender and tapering posteriorly; rostrum broad across nasolachrymal capsules; zygomatic region massive, arches relatively narrow and constricted slightly across jugals; zygomatic notch (at anterior opening of infraorbital foramen as viewed from above) deep; zygomatic processes of maxillae and squamosals broad and massive in lateral view; braincase and interorbital region

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Table 1. Cranial measurements of several subspecies of *Micromys minutus*

|                                                                         | Occipitonasal length | Nasal length | Basal length | Zygomatic breadth | Breadth of braincase | Depth of braincase | Palatal length | Length of upper molar-form toothrow | Length of lower molar-form toothrow | Interorbital breadth |
|-------------------------------------------------------------------------|----------------------|--------------|--------------|-------------------|----------------------|--------------------|----------------|-------------------------------------|-------------------------------------|----------------------|
| <i>Micromys minutus hertigi</i> , 2 mi. SE Mosulp'o, Cheju Do, Korea    |                      |              |              |                   |                      |                    |                |                                     |                                     |                      |
| USNM 299103 ♂                                                           | 21.5                 | 7.1          | 17.2         | 10.0              | 9.7                  | 6.1                | 10.0           | 3.3                                 | 3.0                                 | 3.8                  |
| USNM 299104 ♀ (type)                                                    |                      |              |              |                   | 9.8                  | 6.3                |                |                                     | 3.1                                 |                      |
| <i>Micromys minutus ussuricus</i> , various localities in central Korea |                      |              |              |                   |                      |                    |                |                                     |                                     |                      |
| Average 7 (2 ♂, 5 ♀)                                                    | 19.5                 | 6.0*         | 16.1         | 9.4*              | 9.2                  | 6.1                | 9.5            | 3.2                                 | 3.0                                 | 3.4                  |
| Minimum                                                                 | 18.8                 | 5.7          | 15.5         | 9.3               | 9.0                  | 5.6                | 9.2            | 3.0                                 | 2.8                                 | 3.2                  |
| Maximum                                                                 | 20.1                 | 6.5          | 17.2         | 9.6               | 9.4                  | 6.3                | 9.9            | 3.4                                 | 3.1                                 | 3.6                  |
| <i>Micromys minutus ussuricus</i> , 5 mi. W Kwangju, Korea              |                      |              |              |                   |                      |                    |                |                                     |                                     |                      |
| USNM 299100 ♂                                                           | 19.2                 | 6.5          | 15.9         | 9.4               | 9.2                  | 6.3                | 9.4            | 3.1                                 | 2.8                                 | 3.4                  |
| USNM 299101 ♂                                                           |                      | 6.9          |              | 9.8               | 9.4                  |                    | 9.9            | 3.2                                 | 2.9                                 | 3.5                  |
| <i>Micromys minutus pygmaeus</i> , Yochow, Hunan, China                 |                      |              |              |                   |                      |                    |                |                                     |                                     |                      |
| USNM 239537 ♀                                                           | 21.1                 | 6.9          | 17.3         | 9.8               | 9.3                  | 6.7                | 10.2           | 3.2                                 | 3.0                                 | 3.7                  |
| USNM 239539 ♀                                                           | 20.0                 | 6.6          | 16.1         | 9.9               | 9.4                  | 6.4                | 9.7            | 3.1                                 | 3.0                                 | 3.3                  |

\*6 specimens

broad; braincase relatively shallow; toothrows relatively short; mesopterygoid fossa narrow, pterygoids not especially divergent posteriorly; incisive foramina narrow, not reaching level of molariform toothrow; auditory bullae only moderately inflated.

*Measurements.*—External measurements of the type specimen and a young adult male are, respectively, as follows: Total length, 160, 147; length of tail vertebrae, 84, 81; length of hind foot, 18, 17; length of ear from notch, 10, 10. For cranial measurements see Table 1.

*Comparisons.*—From *Micromys minutus ussuricus* of the adjacent Korean mainland (specimens from various localities in central and southern Korea), *M. m. hertigi* differs in: Dorsal coloration, in comparable pelages, conspicuously brighter ochraceous, especially mid-dorsally; skull larger in all measurements taken (especially breadth of braincase, occipitonasal and nasal lengths, and zygomatic and interorbital breadths) except depth of braincase and length of toothrows; zygomatic notch deeper; zygomatic processes of maxillae and squamosals broader and more massive; nasals narrower and more tapering posteriorly; mesopterygoid fossa relatively narrower, pterygoids less divergent posteriorly. From *Micromys minutus pygmaeus* of central and southern China (specimens from Yochow, Hunan), *M. m. hertigi* differs in: Dorsal coloration brighter ochraceous; occipitonasal length, nasal length and zygomatic breadth greater; braincase much broader but not so deep; zygomatic notch deeper; nasals narrower; pterygoids less divergent posteriorly.

*Remarks.*—*M. m. hertigi* seemingly differs from all other described races of *Micromys minutus* in the Orient in generally larger cranial size, a deeper zygomatic notch, broader braincase and brighter ochraceous dorsal coloration. We have seen no specimens of *Micromys minutus aokii* of Tsushima Island or *Micromys minutus japonicus* of southern Japan. However, judging from the descriptions and measurements given by Kuroda (1922:43-44 and 1933:243-244) and measurements listed by Imaizumi (1949:264), both differ from *hertigi* in much the same manner as does *ussuricus*, that is to say, in smaller cranial dimensions and duller ochraceous dorsal pelage. Additional measurements of *M. m. pygmaeus* from South China are listed by Allen (1940:963-964).

Specimens from the Korean mainland are uniformly darker in dorsal coloration than *hertigi* save for a specimen from Songu-ri which approaches it in color. An adult male from 5 miles west of Kwangju, southwestern Korea, approaches *hertigi* in some cranial measurements.

We know of no previous report of harvest mice from Quelpart Island. The subspecies herein described is presumed to occur throughout the island in suitable habitat. Both specimens were trapped in rank grass along an improvised airstrip within sight of the East China Sea. Traps were baited with rolled oats. Patronymic recognition is accorded Dr. Marshall Hertig, Director, Commission on Hemorrhagic Fever, Armed Forces Epidemiological Board, without whose cooperation and understanding our Korean collections could not have been gathered.

*Specimens examined.*—Two, from the type locality (USNM 299103 and 299104).

#### *Apodemus agrarius pallescens*, new subspecies

*Type.*—Adult female in summer pelage, skin and skull, United States National Museum no. 299161, from 8 miles southwest of Kunsan, 10

meters, Korea; obtained 26 September 1954 by J. Knox Jones, Jr., original no. 1713.

*Distribution*.—Coastal areas of southern and southwestern Korea.

*Diagnosis*.—Upper parts drab ochraceous, sides pale ochraceous; dark dorsal stripe pale and indistinct; size, both external and cranial, relatively large.

*Description*.—Size: Large among subspecies of *agrarius* from the eastern Asiatic mainland, tail shorter than head and body; hind feet and ears moderately large (see measurements). Color: Upper parts (summer pelage) near Light Ochraceous-Buff, lined with black and giving an overall drab ochraceous appearance; sides somewhat paler in color; dorsal stripe indistinct; feet pale yellowish-white above, darker below; ears light brownish with anterior fringe of Ochraceous-Buff hairs; tail indistinctly bicolor, pale brownish above, lighter below; underparts grayish-white. Skull: Relatively large (see measurements), similar to *A. a. coreae*; zygomatic and interorbital regions relatively broad; zygomatic arches rather straight in jugal area as viewed from above, usually broadest across processes of squamosals; incisive foramina slightly expanded posteriorly; auditory bullae moderately inflated; rostrum somewhat shortened; interparietal bone broad; supraorbital ridges well developed; mesoterygoid fossa wide, pterygoids divergent posteriorly.

*Measurements*.—External and cranial measurements of the type specimen, followed by average and extreme measurements of eight other adults (five males and three females) from the type locality, are as follows: Total length, 205, 205.1 (195-217); length of tail vertebrae, 90, 90.0 (79-94); length of hind foot, 22, 22.0 (21-23); length of ear from notch, 14, 14.4 (14-15); occipitonasal length, 28.8, 27.9 (27.1-29.0); basal length, 24.5, 23.9 (23.4-25.0); zygomatic breadth, 13.7, 13.0 (12.5-13.5); interorbital breadth, 4.5, 4.5 (4.3-4.8); depth of braincase, 8.4, 8.2 (7.9-8.4); length of incisive foramina, 5.6, 5.6 (5.3-6.0); length of upper molariform toothrow, 4.1, 4.3 (4.1-4.4); length of nasals, 10.8, 10.5 (10.1-10.9).

*Comparisons*.—From *Apodemus agrarius coreae*, geographically adjacent to the north (specimens from various localities in central Korea), *A. a. pallescens* differs in: Dorsal coloration averaging drabber and paler, sides with less ochraceous wash; dark dorsal stripe paler and less distinct; size averaging slightly larger in both external and cranial dimensions. The skull of *pallescens* is very similar to that of *coreae*. From *Apodemus agrarius pallidior* of the Shantung Peninsula and adjacent coastal areas of North China (specimens from Tientsin, China), *A. a. pallescens* differs in: Larger in all external and most cranial dimensions; skull in general more robust; braincase deeper; dorsal color (compared with *pallidior* in winter pelage) less gray, dorsal stripe much less distinct. For comparisons with the mice of Quelpart Island, see the following account.

*Remarks*.—*Apodemus agrarius pallescens* is apparently the most drab-colored subspecies of the species in eastern Asia and can be distinguished from other described races on the basis of that character. A cline exists in the color of pelage of *Apodemus agrarius* from the subspecies *mantchuricus* of the forested mountainous areas of Manchuria (dark), southward to the coastal areas of the southern parts of Korea

(pale). We also note, to a lesser extent, a correlated increase in size. Thomas (1908:8) has described *coreae* from near the middle portion of this cline. The race *pallescens* here described represents the southern terminus of it.

A parallel cline, at least in color, appears to run westward from the range of *mantchuricus* to culminate in the pale race, *pallidor*, of north-eastern China.

*Specimens examined*.—Sixty-nine, all from Korea, as follows: 8 mi. SW Kunsan, 10 meters, 28 (USNM 299143-170); 5 mi. W Kwangju, 13 meters, 16 (USNM 299171-186); Mokp'o, 100-300 feet, 4 (British Museum 6.12.6.56-59); 5 mi. ENE Pusan, 2 meters, 16 (USNM 299187-201); Pusan, 5 (USNM 298164-167, British Museum 6.12.6.55).

*Apodemus agrarius chejuensis*, new subspecies

*Type*.—Adult male in summer pelage, skin and skull, United States National Museum no. 299204, from 10 miles northeast of Mosulp'o, 420 meters, Cheju Do (Quelpart Island), Korea; obtained 7 September 1954 by George W. Byers, original no. 1641 of J. Knox Jones, Jr.

*Distribution*.—Known only from Cheju Do, Korea.

*Diagnosis*.—Upper parts dark ochraceous; underparts gray tinged with buff; dark dorsal stripe distinct; size large in all external measurements taken; skull large (especially in occipitonasal, basal and nasal lengths) and relatively massive.

*Description*.—Size: Larger than in any named subspecies of *Apodemus agrarius*; tail relatively long, but shorter than head and body; hind feet and ears large (see measurements). Color: Upper parts (summer pelage) between Ochraceous-Buff and Raw Sienna, moderately to heavily lined with black and giving an average overall glossy, dark-ochraceous appearance; sides somewhat lighter in color; dorsal stripe distinct, black; feet grayish above (except for white hairs surrounding nails), blackish below; ears blackish-brown with anterior fringe of orange-ochraceous hairs; tail indistinctly bicolor, blackish above, lighter below. Skull: Large (see measurements); nasals long; zygomatic and inter-orbital regions massive; zygomatic processes of maxillae and squamosals large; braincase deep and relatively narrow; rostrum long, relatively narrow across nasolachrymal capsules; supraorbital ridges well developed; incisive foramina long; mesopterygoid fossa wide, pterygoids divergent posteriorly; bullae moderately inflated.

*Measurements*.—External and cranial measurements of the type specimen, followed by average and extreme measurements of eight other adults (seven males and one female) from the vicinity of the type locality, are as follows: Total length, 221, 223.1 (216-232); length of tail vertebrae, 104, 102.6 (96-107); length of hind foot, 23, 24.0 (23-25); length of ear from notch, 15, 15.7 (15-17); occipitonasal length, 30.2, 30.1 (29.5-30.6); basal length, 25.6, 25.5 (25.0-26.3); zygomatic breadth, 13.6, 13.7 (13.0-14.4); interorbital breadth, 4.8, 4.8 (4.6-5.1); depth of braincase, 8.8, 8.5 (8.2-9.1); length of incisive foramina, 5.7, 5.8 (5.7-6.0); length of upper molariform toothrow, 4.4, 4.4 (4.2-4.5); length of nasals, 11.7, 11.5 (11.0-11.7).

*Comparisons*.—From *Apodemus agrarius pallescens* of the coastal areas of southern Korea, *A. a. chejuensis* differs in: Size, both external and cranial, much larger; upper parts, feet tail and ears darker; dorsal



stripe more distinct; underparts more buffy. *A. a. chejuensis* differs in most of the same features from *A. a. pallidior* of the Shantung Peninsula and from *A. a. manchuricus* of Manchuria and *A. a. coreae* of central Korea. The dorsal coloration approaches that of *manchuricus* but is richer and has a more cinereous appearance.

*Remarks.*—*Apodemus agrarius chejuensis* is larger, both externally and cranially, than any other described subspecies of *Apodemus agrarius* and is easily distinguished from the other known races. The rich, dark coloration of *chejuensis* seems to reflect the color of the dark, reddish volcanic soils of the island where it is found.

Thomas (1907:863) and Kuroda (1934:233) have previously reported specimens from Quelpart Island but neither separated them subspecifically from the adjacent mainland population. Lack of adequate comparative material and the small numbers of specimens available to them may explain the fact that these earlier workers failed to recognize this well marked insular race.

*Specimens examined.*—Thirty-one, all from Cheju Do, Korea, as follows: 2 mi. SE Mosulp'o, 3 meters, 3 (USNM 299220-222); 4 mi. E Mosulp'o, 100 meters, 5 (USNM 299215-219); 6 mi. NE Mosulp'o, 200 meters, 9 (USNM 299207-214 and 299627); 10 mi. NE Mosulp'o, 420 meters, 5 (USNM 299203-206 and 299626); 6 mi. NNE Sogwi-ri, 460 meters, 2 (USNM 299223-224); no exact locality, 3000-4500 feet, 7 (British Museum 6.12.6.5-11).

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A NEW CHIPMUNK FROM KOREA

BY DAVID H. JOHNSON<sup>1</sup> AND J. KNOX JONES, JR.<sup>2</sup>

Study of Korean mammals in the United States National Museum has revealed the existence of a new chipmunk of the species *Eutamias sibiricus*. This is the second contribution from a cooperative investigation currently being carried out by the U. S. National Museum, the Commission on Hemorrhagic Fever, Armed Forces Epidemiological Board, and the Army Medical Service Graduate School.

All measurements are in millimeters. Capitalized color terms are from Ridgway (Color standards and color nomenclature, Washington, 1912).

*Eutamias sibiricus barberi*, new subspecies

*Type*.—Adult female in summer pelage, skin and skull, United States National Museum no. 298042, from Central National Forest, near Pup'-yong-ni (37° 44' N, 127° 12' E), Korea; obtained 26 August 1952 by William H. Lawrence, original no. B12068.

*Distribution*.—Central and southern parts of Korea.

*Diagnosis*.—Upper parts and sides with conspicuous ochraceous tinge; rump washed with rufous; underparts of tail orange-ochraceous; skull large and distinctly rounded in lateral profile; rostrum conspicuously down-curved; upper incisors distinctly recurved.

*Description*.—Size medium for species (see measurements). Color (summer pelage): Crown and dark facial stripes between Ochraceous-Orange and Ochraceous-Tawny, mixed with black; cheeks near Ochraceous-Buff, finely lined with black; postauricular patch and posterior half of outer surface of ear grayish-white; nape of neck grayish; three median dark dorsal stripes black, finely lined with dark ochraceous; outermost dark dorsal stripes more suffused with dark ochraceous; inner pair of light dorsal stripes averaging between Ochraceous-Buff and Ochraceous-Orange, lighter anteriorly; outer light dorsal stripes whitish, tinged with pale ochraceous; lower sides darker, approaching Ochraceous-Buff; rump heavily washed with rufous; feet dull orange-ochraceous above, dark below; underparts whitish, hairs wholly white on chin, throat, and inner sides of legs, gray-based elsewhere; tail blackish, conspicuously frosted with white above; median ventral area of tail between Ochraceous-Buff and Ochraceous-Orange. Skull: Large and robust though relatively narrow (see measurements); dorsal outline

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distinctly rounded in lateral profile; rostrum broad and conspicuously down-curved; upper incisors distinctly recurved; cheekteeth relatively small; mesopterygoid fossa relatively narrow, its lateral margins parallel; pterygoids slightly divergent posteriorly; auditory bullae small.

*Measurements.*—External and cranial measurements of the type specimen, followed by average and extreme measurements of eight other adults (one male and seven females) from the type locality, are as follows: Total length, 267, 270.1 (258-285); length of tail vertebrae, 104, 118.8 (102-129); length of hind foot, 36, 37.8 (35-40); length of ear, 17, 18.3 (17-19.5); occipitonasal length, 40.5, 40.8 (39.9-42.0); basal length, 34.7, 34.3 (33.9-34.9); zygomatic breadth, 22.8, 22.0 (21.7-22.3); mastoid breadth, 16.5, 16.8 (16.5-17.3); breadth behind post-orbital processes, 11.3, 11.6 (10.8-12.3); length of nasals, 13.1, 13.3 (12.5-14.4); depth of skull, 15.4, 15.6 (15.2-15.9); length of upper molariform toothrow, 6.6, 6.5 (6.2-6.8).

*Comparisons.*—From *Eutamias sibiricus orientalis*, geographically adjacent to the northeast (specimens from Nonsatong, northeastern Korea, and several localities in central and southern Manchuria), *E. s. barberi* differs in: Upper parts and sides, in general, more ochraceous, rump more rufous; dark dorsal stripes less distinct; under side of tail brighter ochraceous; skull slightly larger and more robust; its dorsal outline more rounded in lateral profile; rostrum more down-curved and averaging broader; upper incisors less procumbent; roof of skull in postorbital region broader. From the type specimen of *Eutamias sibiricus senescens* from 15 miles west of Peking, China, specimens of *E. s. barberi* differ in: Upper parts, in general, more ochraceous; dark dorsal stripes more distinct; rump decidedly more rufous; feet and under side of tail brighter ochraceous; skull narrower, especially across rostrum and zygomatic arches; nasals averaging shorter; incisors more recurved; upper molariform teeth smaller.

*Remarks.*—*E. s. barberi* is a well marked subspecies of *Eutamias sibiricus*. Some of the characters separating it from geographically adjacent subspecies are of the same magnitude as characters which separate full species of the same genus in western North America.

We have named this new chipmunk for Albert A. Barber, formerly with the Field Unit of the Commission on Hemorrhagic Fever, who helped to obtain many of the Korean mammals now in the U. S. National Museum.

*Specimens examined.*—Forty-one, all from Korea, as follows: Central National Forest, near Pup'yong-ni, 21 (USNM 298040-48, 299084-87, 299582; Mus. Nat. Hist., Univ. Kansas, 60404-09; Mus. Zool., Univ. Michigan, 99587); 1 mi. N Chinbu-ri, 400 meters, 1 (USNM 298945); 4 mi. N Chip'o-ri, 150 meters, 1 (USNM 298946); Chongyang-ni, 1 (USNM 298039); Hill 1468, 3 mi. SSE Sumil-li, 4 (USNM 298947, 299082-83, 299583); Kaloguai, 55 mi. NE Seoul, 1 (British Museum, 7.6.3.23); Kimhoa, 65 mi. NE Seoul, 4 (British Museum, 7.6.3.19-22); Kuksa-bong, 1 (USNM 298049); Sangbonch'on-ni, 1 (USNM 298944); Seoul, 3 (USNM 283634, 299599-600); Songu-ri, 3 (USNM 294632, 298037-38).

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A NEW SPECIES OF FREE-TAILED BAT (GENUS  
*EUMOPS*) FROM BRAZIL

BY CHARLES O. HANDLEY, JR.

Included in a group of bats received by the U. S. National Museum as an exchange from the Museu Paulista, São Paulo, Brazil, in 1904, is a specimen apparently distinct from named species. It may be recognized by the following description:

*Eumops amazonicus* sp. nov.

*Holotype*.—U.S.N.M. no. 123827; young adult, skin and skull (digital epiphyses ossified and teeth slightly worn); collected in 1899, by "Bicego"; Manáos, Amazonas, Brazil; Museu Paulista number 365a.

*Distribution*.—Known only from the type locality.

*Description*.—Tooth formula,  $1/2-1/1-2/2-3/3 = 30$ . Upper incisors in contact with one another at base but tips divergent, one millimeter apart; cingula of incisor and canine separated by 0.25 mm. space; upper canine small, both in height and in diameter at cingulum;  $P^1$  in tooththrow, not crowded, touching canine but not touching  $P^4$ ;  $P^4$  relatively small and compact, outline at cingulum not showing bulges of cusp bases;  $M^3$  with third commissure almost as long as second and metacone almost as high as mesostyle. Mandibular tooththrow not excessively crowded; incisors arranged in semicircle, only slightly imbricated; talonid of  $M_3$  with two prominent cusps. Mesopterygoid fossa broad anteriorly, narrowing posteriorly; basisphenoid pits large, deep, and well defined, considerably exceeding mandibular fossae in area; palate extending posteriorly about one millimeter beyond level of rear edges of third molars; brain case shallow; rostrum narrow; lachrymal ridges and sagittal and lambdoidal crests only slightly developed.

Lips apparently without wrinkles; tragus small, with rounded tip; auricle probably extending beyond tip of snout when laid forward; keel of auricle, 11.6 mm.; connecting membrane on forehead seemingly about 3 mm. high. Connecting membrane and inner edge of keel, anterior base of forearm, and membrane posterointernal to wrist, hairy. Other parts of auricle, face, and membranes essentially naked.

Dorsum rich blackish brown, considerably more blackish than Carob Brown; bases of hairs like tips on lower back, paler than tips on nape and upper back; hairs of underparts tricolor, whitish at base and tip, brownish medially, mass effect about Verona Brown (capitalized color terms from Ridgway, *Color standards and color nomenclature*, 1912).

*Measurements* (in millimeters).—Greatest length (not including incisors) 17.3, basal length 14.9, zygomatic breadth  $10.6 \pm$ , interorbital breadth 4.0, mastoidal breadth 9.8, depth of brain case (not including auditory bullae) 5.9, maxillary tooththrow 6.7, palatal breadth (between

outer margins of  $M^3$ ) 7.4, post-palatal length (posterior margin of palate to anteroventral lip of foramen magnum) 7.7, breadth of mesopterygoid fossa 2.5, forearm 36, tibia 11.5.

*Comparisons.*—*Eumops amazonicus* agrees in all details with Miller's diagnosis of the genus *Eumops* (Bull. U. S. Nat. Mus., 57:257, 1907). For diagnoses of other species of this genus, see: Sanborn, Jour. Mamm., 13(4):347, 1932; Goodwin, American Mus. Novit., 1075:2, 1940; Benson, Proc. Biol. Soc. Washington, 60:133, 1947; Hall & Villa, Univ. Kansas Publ. Mus. Nat. Hist., 1(22):445, 1949.

*Eumops amazonicus* is most like *E. hansae* Sanborn, but is considerably smaller (greatest length of skull 17.3 mm. as opposed to 20.7 mm.; forearm 36 mm. in contrast to 41.5 mm.). Characters of the upper incisors, canine,  $P^4$ ,  $M^3$ , palate, and basisphenoid pits are similar in the two species, and they agree in having the forearm relatively shorter than any other species of the genus. The forearm is about twice the greatest length of the skull in *amazonicus* and *hansae*, about two and one-half times the greatest length in other species.

*Eumops amazonicus* resembles *E. bonariensis* (specimens from Asuncion and Villa Rica, Paraguay) in size, but differs from it in many dental and cranial details. *E. bonariensis* has the upper incisors with less divergent tips; the upper canine larger, almost touching  $I^1$  and  $P^4$  and forcing  $P^1$  out of toothrow;  $P^4$  wider and the bases of the cusps bulging at the cingulum; the third commissure of  $M^3$  shorter than the second commissure; the lower incisors more crowded; the posterior border of the palate about at the level of the posterior edge of  $M^3$ ; the mesopterygoid fossa narrow anteriorly and broadening posteriorly; the basisphenoid pits small, shallow, and somewhat ill-defined, equaled or surpassed in area by the mandibular fossae; the lachrymal, sagittal, and lambdoidal crests better developed; and the brain case deeper (its depth equal to 43-44 per cent of the basal length in *E. bonariensis*, 40 per cent in *E. amazonicus*).

*Specimen examined.*—The holotype.



PROCEEDINGS  
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FOUR NEW AMERICAN CHILOPODS

RALPH V. CHAMBERLIN

The following species of chilopods are herewith described as new.

Scolopendridae

*Scolopendra malkini* new species

Color light testaceous brown.

Head without sulci. smooth and non-punctate. Antennae composed of 30-31 articles.

First tergite with a deep cervical sulcus but with no longitudinal sulci. The other tergites from the second to the penult bisulcate. Last tergite with no median sulcus, its caudal margin conspicuously convex or arcuate.

Prehensors with plate smooth and without a transverse sulcus; pre-sternal teeth 4 + 4, the two innermost on each side fused except at tips.

Last coxae each with a conical process which bears six spinules; caudal margin of coxa ectad of the process also with a spinule.

Prefemur of anal legs with a short, distally rounded, process at inner distal corner, bearing above 4-6 spinules; numerous spinules on mesal and ventral surface, these forming 5-6 longitudinal series with 5-7 spinules in each series; the other joints without spinules.

Legs one to twenty with a tarsal spine.

Length, 45 mm.

Locality.—Mexico: Sonora, Estero de Sargente, 25 mm. south of Desemboque. One specimen taken August 12, 1953 by Borys Malkin (#95).

Structurally this species is near to *S. pachygnatha* Pocock, which was described from Zacatecas. It differs in the more numerous articles of the antennae and in having a well developed conical caudal process on the last coxae as well as in the spining of the anal legs.

Chilenophilidae

*Cheiletha phoenix* new species

Sides of head parallel over middle portion of length, curving at ends to the straight posterior and anterior margins. Head longer than wide in the ratio 7:5. No frontal suture evident.

Basal plate trapeziform, about as wide posteriorly as the greatest width of the head. Prehensors much exposed from above, the claws when closed surpassing the end of the first antennal article; claw with a conical tooth at base and a blunt tooth present at distal end of femuroid; prosternum with two rounded tubercles on anterior margin, these small; no sclerotic lines on prosternum.

One clypeal spot which is distinctly areolate. Lateral pieces of labrum meeting in front of the middle piece as usual. First maxillae with two pairs of long sensory lappets.

Dorsal plates bisulcate and punctate. Sternites with a median sulcus; strongly punctate, the punctae subdensely arranged. Ventral pores not detected.

Spiracles all circular, the first decidedly larger than the second.

Last ventral plate moderately wide, its sides straight and converging caudad. Coxal pores about nine on each side, arranged in a subelliptic line along margin of sternite and middle of coxal surface.

Anal pores present.

Pairs of legs in the female holotype, 57.

Length, about 26 mm.

Locality.—Arizona: Phoenix, South Mts. One female taken April 10, 1953.

This species differs from *C. alaska*, the generotype, in having the teeth of the labrum much stouter, the fewer coxal pores and their arrangement.

#### *Cheiletha kincaidi* new species

General color yellow, with head and prehensors chestnut.

Basal plate overlapped by the cephalic, about as wide posteriorly as the head where widest. Prehensors much exposed from above as in the other known species, the claws when closed surpassing the distal end of the first antennal article. Anterior margin of the prosternum unarmed; a small tooth at distal end of femuroid and one at base of claw, the intermediate joints each with each with a minute or abortive denticle.

The lappets of the first maxillae two on each side, these especially long and conspicuous. Coxae of the second maxillae connected at the middle only by a narrow, finely areolate isthmus.

Dorsal plates bisulcae, smooth.

All spiracles circular, the first much larger than the second.

A few of the most anterior sternites angularly produced behind, the angle more or less overlapped by the succeeding plate.

Last ventral plate long and narrow, narrowing caudad. Coxal pores about twelve, one more isolated in caudal position, the others chiefly along sternite and tergite, leaving the median part of the surface usually free of pores.

Anal pores present.

Pairs of legs, 47-49.

Length, 25-27 mm.

Locality.—Washington: Ocean Park. Three specimens taken July 22, 1954, by Professor Trevor Kincaid, for whom the species is named.

#### Ethopolidae

##### *Ethopolys bipunctatus insulatus* new subspecies

Body showing very little pigment, faintly yellowish.

Ocelli unpigmented; 1—4, 3, 3, with the single ocellus large, the others very small. Antennae long, composed of twenty long, slender articles.

Prosternal teeth very small, 3-6 + 6-3, the outer three separated from the others by a diastema, the innermost tooth of the outer three minute and the innermost tooth of the inner group also minute and located down the margin of the median sinus.

Anal legs long and unmodified in the male; ventral spines 1, 1, 3, 1, 1,

the dorsal spines 1, 0, 2, 1, 0 with the claw armed with an accessory claw. Penult legs with ventral spines 1, 0, 2, 2, 2,; the dorsal spines 1, 0, 2, 1, 1; an accessory claw present.

Dorsal plates rugose, none with posterior angles produced.

Coxal pores small and multiseriate in the usual manner.

Length, about 11 mm.

Locality.—Utah: Stansbury Island, in "Spider Cave." One male taken November 8, 1952.

In the proportionately great length of antennae agreeing with *E. bipunctatus* but a much smaller species which also differs, e.g., in having three teeth ectad of the diastema in the prosternal series instead of two, etc. It is, however, of not more than subspecific rank.



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TWO NEW JERBOAS FROM EGYPT

BY HENRY W. SETZER

*United States National Museum*

Collections of mammals from Egypt are being studied to determine the taxonomic status and geographic distribution of the various species within the confines of that country. As a result of this study, two subspecies of jerboas are found to differ from previously named kinds.

The specimens on which the following descriptions are based have been made available for study by the U. S. Naval Medical Research Unit No. 3 of Cairo, and by the authorities of the Chicago Natural History Museum. All measurements are in millimeters and the capitalized color terms are from Ridgway's *Color Standards and Color Nomenclature*.

*Jaculus jaculus elbaensis* subsp. nov.

*Type*.—Chicago Natural History Museum, number 82295, adult male, skin and skull, from Wadi Darawena, (36° 22' E, 22° 11' N) Jebel Elba, Sudan Government Administrative Area, Egypt. Obtained 9 March 1954 by Makram Kaiser, original number 10084 of Harry Hoogstraal.

*Specimens examined*.—Fifteen, from: *Sudan Government Administrative Area*, Bir Sarrara, 1; Wadi Darawena, Jebel Elba, 1; 3 mi. N Jebel Elba, 1; 2½ mi. N Jebel Elba, 5; *Eastern Desert Governorate*, Bir Abraq, 6; Wadi Na'am, 1.

*Diagnosis*.—General overall dorsal coloration Clay Color. Individual hairs plumbeous at base, banded with Cinnamon-Buff, and finely tipped with black. Entire underparts, hip stripe, dorsal surfaces of hands and feet, and tip of tail pure white. Length of tail, hind foot and ear about normal for the species. Skull with auditory bullae markedly inflated posteriorly. Top of skull not domed; rostrum wide; zygomatic arches rather massive; upper incisors broad and anteroposteriorly thickened; palate broad.

*Measurements of the type specimen*.—Total length 276; length of tail 178; length of hind foot 63; length of ear 22; greatest length of skull 33.0; condyloincisive length 28.2; crown length of upper molariform toothrow 4.6; greatest breadth across anterior zygomatic processes 23.3; least interorbital breadth 11.8; median length of nasals 12.2; breadth of rostrum at level of antorbital foramen 4.9; greatest breadth of braincase 23.1.

*Comparisons*.—From *Jaculus jaculus butleri*, which is the subspecies closest geographically, *J. j. elbaensis* differs in brighter color in comparable pelages, larger size, markedly larger skull in all respects, particularly a greater posterior inflation of the auditory bullae, shorter

space between the hard palate and the ventral anterior inflation of the auditory bullae, markedly larger upper incisors, wider rostrum, and somewhat larger upper molars.

From *Jaculus jaculus jaculus*, as known from Giza Province, *Jaculus jaculus elbaensis* differs in somewhat darker color, (with more admixture of red). The skull of *elbaensis* is larger, the auditory bullae more inflated posteriorly, the anterior palatine foramina larger, the upper incisors larger, the upper molars larger, and the space between the hard palate and the ventral anterior inflation of the auditory bullae shorter.

*Remarks.*—The specimen from Wadi Na'am shows intergradation in color between *J. j. jaculus* and *J. j. elbaensis*. In addition, the cranium of this specimen also shows characters which can be interpreted as intergradation in the degree of inflation of the auditory bullae, the distance between the hard palate and the ventral anterior inflation of the auditory bullae, and in the degree of doming of the skull. In the majority of the characters studied this specimen seems nearer to *J. j. elbaensis* and is so referred.

No intergradation can be demonstrated, as yet, between *J. j. butleri* and *J. j. elbaensis*.

*Jaculus jaculus favillus* subsp. nov.

*Type.*—Chicago Natural History Museum, no. 75708, adult female, skin and skull, from Bir Bosslanga, Salum, Western Desert Governorate, Egypt. Obtained 25 October 1953 by Harry Hoogstraal, original number 9718.

*Specimens examined.*—Five, from: *Western Desert Governorate*, Bir Bosslanga, 1; Mersa Matruh, 1, Sidi Barrani, 3.

*Diagnosis.*—Upper parts, in general overall color, near Buckthorn Brown, hairs banded with pure color near Tawny Olive. All hairs plumbeous at base and rather broadly tipped with black. Hind foot relatively long and broad. Skull large; auditory bullae markedly inflated both ventrally and posteriorly; rostrum broad; dorsal surface of skull rather more arched than usual.

*Measurements of the type specimen.*—Total length 296; length of tail 181; length of hind foot 64; length of ear 26; greatest length of skull 34.0; condyloincisive length 29.9; greatest breadth across anterior zygomatic processes 23.0; least interorbital breadth 12.6; median length of nasals 11.8; breadth of rostrum at level of antorbital foramen 5.0; greatest breadth of braincase 23.5.

*Comparisons.*—*Jaculus jaculus favillus* may be distinguished from *J. j. jaculus*, as known from Abu Ghâlib, Giza Province, by its darker color, longer hind foot and longer ear. The skulls of *favillus* may be differentiated by markedly larger size, more pronounced inflation of the auditory bullae, wider rostrum, and generally longer anterior palatine foramina.

*Remarks.*—This subspecies apparently represents an eastward extension of the Libyan fauna into extreme western Egypt where the influence of the more humid sections of the Mediterranean littoral is exerted on numerous other kinds of animals and plants, many of which are stopped in their eastward range by the harsh conditions existing in the Egyptian deserts.



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STATUS OF THE GENERIC NAME *ZORILLA*  
(MAMMALIA): NOMENCLATURE  
BY RULE OR BY CAPRICE

BY PHILIP HERSHKOVITZ

*Chicago Natural History Museum*

An article by Ellerman and Morrison-Scott (1954) entitled "*Ictonyx* Kaup, 1835, the correct generic name, and *Ictonyx striatus* (Perry), 1810, the correct specific name for the African Stinkmuishond," brings to the fore three fundamental issues, as follows.

I. Shall a generic name be applied to some one of the animals originally described under that name, or may it be restricted to an animal alien to the original description of the genus?

II. Shall the type of a genus be one of the species included in the original definition of that genus, or may it be some other species selected by a future reviser?

III. Shall a post-Linnaean taxonomic work that has been printed, distributed and consistently cited in scientific publications for its valid binomials be duly recognized, or may it be suppressed in part or in whole according to the dictates of convenience or prejudice?

The first question refers to the status of the generic name *Zorilla*. Hershkovitz (1953: 378-379) deemed it relevant to present a full transcription of the original description of the genus *Zorilla* I. Geoffroy as documentary evidence for the pertinence of that name to African polecats. Ellerman and Morrison-Scott (1953, 1954) have made it evident, on the other hand, that they regard the text of the description of *Zorilla* as irrelevant because they make no allusions to it in their attempt to justify application of the name to American polecats currently and correctly referred to the genus *Spilogale* Gray. To facilitate examination of the problem, a literal translation of the description of *Zorilla* I. Geoffroy (1826:215) is given herewith.

"The zorillas, *Zorilla*. They agree with polecats in their dental formula; in their long powerful claws they are similar to skunks. They also resemble skunks in coloration. Because of the modification of their claws zorillas cannot climb trees as do [some] other mustelids. However, like skunks, they dig well and make burrows. Not more than *one species* [italics mine] of this subgenus has been recognized.

"Le Zorille, Buff. T. XIII, pl. 41; *Mustela Zorilla* et *Viverra Zorilla* of systematists, is more than a foot long from the tip of its snout to the base of its tail which is about eight inches long. It is usually black with several white spots on the head and several longi-

tudinal stripes of the same color on the upper part of the body. The stripes and spots are rather constant in pattern but their proportional size varies considerably. The species is not restricted to the Cape of Good Hope; it occurs, also in Senegal and along the shores of the Gambia River where it was found by the ill-fated voyager, Bodwich [sic = Thomas Edward Bowdich, 1791-1824]. The zorilla of Senegal and the Gambia differs in several respects from the one of the Cape. While the same pattern of spots and stripes obtains in both, in the first the white is much more extensive than the black with the result that the pelage is nearly entirely white on the upper parts and the sides of the body. In the Cape variety, the reverse appears to be true. Nevertheless, we do not believe that the two animals should be regarded as each representing a distinct species because the extension of the white varies so much among individuals of any one locality that it is difficult to find two specimens exactly alike."

The above translation supplies the answer to the question of what kind of animals the genus *Zorilla* is based on and the place of origin of those animals. The second question is, shall the type of *Zorilla* be the species of African polecats described in the original definition of the genus or shall it be an exotic American polecat of the genus *Spilogale*? Actually, there is no alternative, because not only is the African species described but it is particularly stated by I. Geoffroy that only the African species is included in the genus *Zorilla*.

Ellerman and Morrison-Scott, on the other hand, follow a peculiar course in their attempt to determine the genotype. They (1954:130) first quote with approval the statement that, "the type species of *Zorilla* I. Geoffroy, 1826, is, as Hershkovitz (Proc. Biol. Soc. Washington, 62:14, 1949) points out, 'Le Zorille, Buff. T. XIII, pl. 41; *Mustela Zorilla* et *Viverra Zorilla* des auteurs systématiques'." They go on, however, to declare, "since the only bibliographic reference is to Buffon, the identity of *Zorilla* I. Geoffroy must clearly be that of Buffon's plate." This obviously is not the case.

The generic name *Zorilla* is *not* based on a description of Buffon's *zorille* or on a reference to it. The name is based clearly, unequivocally and *exclusively* on a description of specimens of African polecats placed before the author, I. Geoffroy. Indeed, the original definition of *Zorilla* remains to this day the best taxonomic treatment of these animals. Inclusion of a bibliographic reference to Buffon's *zorille* in the indicated genotype rests solely on Geoffroy's assumption that the animal is the same as the "*Mustela Zorilla* et *Viverra Zorilla* des auteurs systématiques." Buffon's *zorille* cannot stand alone as genotype on the premise, apparently adopted by Ellerman and Morrison-Scott, that the whole is equal to any of its parts. The charge of "selection," cancellation and substitution of type species, directed by Ellerman and Morrison-Scott (1954-130) against me, actually applies to action taken by those authors.

In this connection, Article 30 Ic of the International Rules of Zoological Nomenclature states, "a genus proposed with a single original species takes that species as its type. (Monotypical genera)." The only species in the original description of *Zorilla* is an African polecat. There can be no "selection." Unfortunately, the name indicated by I. Geoffroy for the species described is composite and ambiguous for

nomenclatural purposes. It consists of three distinct but synonymous elements, namely "Le *Zorille* Buff, T. XIII, pl. 41," and "*Mustela Zorilla*," and "*Viverra Zorilla*." In this case, Article 30 Id of the Code is decisive in resolving the nomenclatural difficulty. It declares that "if a genus, without originally designated or indicated type, contains among its original species one possessing the generic name as its specific or subspecific name, either as valid name or synonym, that species or subspecies becomes *ipso facto* type of the genus. (Type by absolute tautonomy)."

*Mustela zorilla*, by virtue of possessing both generic and subgeneric names as the components of its specific name is indisputably that part of the original genotypic designation that becomes "*ipso facto*" the name of the genotype. It had been shown by me (1953:379) that *Mustela zorilla* I. Geoffroy, 1826, is the same as *Mustela zorilla* E. Geoffroy, 1803. It appears now that the combination *Mustela zorilla* had already been proposed by G. Cuvier in 1798 (Tabl. Élém. Hist. Nat., p. 116) for polecats of the Cape of Good Hope.

It seems that Ellerman and Morrison-Scott missed the point entirely regarding my earlier (1949) use of *Viverra mapurita* Müller, 1776, as the name for the genotype of *Zorilla* I. Geoffroy. This binomial was the first applied strictly to Buffon's *zorille* and cannot be used for anything else. If Buffon's *zorille* is identifiable as an African polecat, Müller's technical name is the earliest for the animal later described by G. Cuvier, E. Geoffroy and I. Geoffroy. Hence *Mustela zorilla* of authors would become *Zorilla mapurita* (Müller) merely by synonymy. The name may change but the genotype does not. If Buffon's *zorille* is not identifiable as an African polecat, Müller's name for it is not available for any African animal described by Geoffroy or by anyone else. Finally, if Buffon's *zorille* is, as Ellerman and Morrison-Scott would have it, an American spotted skunk of the genus *Spilogale*, the name *Viverra mapurita* automatically becomes *Spilogale mapurita* (Müller). Such identification of Buffon's *zorille* would cancel my use of Müller's name for the genotype of *Zorilla* because, according to Article 30 IIA of the Code, an American animal is a species "not included under the generic name at the time of its original publication." To avoid the confusion and controversy entailed by Ellerman and Morrison-Scott's cancellation, I finally proposed (1953:381) that Buffon's *zorille* be considered "not certainly identifiable." Disposition of Buffon's *zorille* made by me, by Ellerman and Morrison-Scott, by I. Geoffroy, or by anyone else, remains on a species level. The status of *Zorilla* as the correct generic name for the species of African polecats described by I. Geoffroy is not in the least affected.

The third question regarding the status of the work cited as a legitimate publication by one author and not recognized by another, was planted by Ellerman and Morrison-Scott (1954:130) in the following manner, "*Mustela zorilla* 'E. Geoffroy, 1803' is unavailable since the Cat. Mamm. Mus. Nat. Hist. was never published. This is made quite clear by I. Geoffroy, 1839, *Magazin de Zoologie* (2) 1, page 5 of the text dealing with mammal plates 1-4, and the work was rejected by Sherborn. Setzer, 1952, *Proc. U. S. Nat. Mus.*, 102: 343, thought that I. Geoffroy said that his father's work *had* been published. But it

transpires (*in. litt.*) that Setzer was relying on a faulty rendering of the French text."

In the above indictment, Ellerman and Morrison-Scott include no analysis of the censured work in the light of any definition, official or otherwise, of what constitutes publication. Their conclusion appears to be based entirely on a misinterpretation of Setzer's published opinion, on a purported change of heart expressed in private correspondence, on an undocumented reference to Sherborn, on an incomplete bibliographic reference to statements made by I. Geoffroy, none of which are quoted. Last, but not least, Ellerman and Morrison-Scott give no indication that they have even examined the work they condemned.

What Setzer (1952:102) said in the place cited by Ellerman and Morrison-Scott, is "The 'Catalogue des Mammifères du Museum National d'Histoire Naturelle' meets all requirements for Linnaean names as established by the International Commission on Zoological Nomenclature. In all instances the descriptions are clearly recognizable. It is believed that the statement of Isidore Geoffroy St.-Hilaire, to the effect that his father never intended the above work for a scientific treatise, should not be accepted, inasmuch as the work is clear, concise, and was published and circulated." I see no reason for altering these statements and I subscribe to them without reservation.

What I. Geoffroy said about the "Catalogue des Mammifères . . ." is variously recorded in three distinct accounts. In the first, the one referred to by Ellerman and Morrison-Scott, I. Geoffroy (1839:5 and footnote 2) notes that (translated literally), "this work, written about 1800 and cited in all mammalogical works, remained unpublished ['*inédit*']. Its printing was well advanced when a protracted illness obliged my father to leave to a person little versed in zoology, the task of completing the work. Upon his recovery, my father recognized that several serious errors had been committed and he renounced the publication of the book. Nevertheless copies [printed] were given away successively to various naturalists [who] by means of their citations [gave] very wide . . . publicity to a work which its author had condemned to oblivion." In the biography of his father I. Geoffroy (1847: 118) explains that it was one of the elder Geoffroy's students who was "entrusted with the task of reading proof." He added that the edition of the "Catalogue . . ." was saved from destruction by its own author because colleagues, notably Cuvier, intervened and thus "the first extended work written by Geoffroy Saint-Hilaire became a part of the science [of mammalogy]." In an appendix to the biography, I. Geoffroy places (p. 241) his father's "Catalogue . . ." at the head of the list of works published by him ["*publiés par lui*"] and adds the descriptive note "Volume in-8°." Finally, in 1851 (*Cat. Meth. Coll. Mamm.*, p. v) I. Geoffroy gives an altered version by stating that his "father wrote part of the "Catalogue . . ." before his journey to Egypt and part of it on his return. He adds that the "volume in-8°" was printed ["*imprimé*"] in 1803 and (*loc. cit.* footnote 2) "distributed both in France and abroad and is cited in all treatises on mammalogy."

It is evident from the text of the above accounts that I. Geoffroy used the term unpublished ["*inédit*"] subjectively in attempting to transmit the wish of his father that the "Catalogue . . ." was dis-



avowed by its author. He then applies the term published ["publié"] objectively when referring to the physical state of the work itself.

Publication and circulation are the requirements for making available properly constituted scientific names proposed in a work by a binomialist. The copy of E. Geoffroy's "Catalogue . . ." consulted by me is housed in the library of the U. S. Department of the Interior. It is not a manuscript or a collection of proof sheets or tear sheets. It is a volume in 8vo with its pages numbered consecutively from 1 to 272. It is printed with the same style type and on the same quality of paper as were other official publications of the Paris Museum at that time. According to Article 25 of the Code, the names in E. Geoffroy's "Catalogue . . ." are valid and according to Article 32, "a generic or a specific name, once published, cannot be rejected, even by its author. . . ." Thus the disavowal of the "Catalogue . . ." by the author, the apologies made by his son, and the protestations raised by Ellerman and Morrison-Scott, are of no avail. Indeed, it appears that these authors regard the "Catalogue . . ." as "unpublished" only on certain occasions. In their "Checklist of Palaearctic and Indian Mammals, 1758 to 1946" Ellerman and Morrison-Scott (1951:581) are of a different humor and list as valid, *Rattus rattus alexandrinus* Geoffroy, 1803, with the citation "1803 *Mus alexandrinus* Geoffroy, Cat. Mamm. H. N. Paris 192. Alexandria, Egypt."

I add a final example on the same subject that bears directly upon the question of whether stability in scientific nomenclature is attained through International Rules or through individual caprice. In another publication, entitled "Southern African Mammals 1758 to 1951: A reclassification," Ellerman and Morrison-Scott, with R. W. Hayman (1953:111) list *Rhabdogale* Wiegmann as a synonym of *Ictonyx* (= *Zorilla*) and "select" *Bradypus striatus* Perry as type species. According to the Code, this action is invalid and void. The original genotype of *Rhabdogale* is "Die Zorillen Afrika's." This leaves nothing for selection. First reviser of the genus *Rhabdogale* is Wagner (1841:219, fig. 133A). He described and figured the monotype "*Rh. mustelina* Wagn." new name for *Mustela zorilla* of authors (Cuvier, Desmarest, I. Geoffroy and Smuts). This subsequent designation (definitely not a "selection") of a name for the genotype of *Rhabdogale* is not subject to change. (cf. Article 30 II f and g of the Rules of Zoological Nomenclature).

The case for *Zorilla* I. Geoffroy, 1826, as generic name for African polecats typified by *Mustela zorilla* G. Cuvier 1798, is so clear as in no way to call for special action by the International Commission on Zoological Nomenclature.

The genus and only included species stands as follows.

#### Genus *Zorilla* I. Geoffroy

*Zorilla* I. Geoffroy, 1826, Dict. Class. Hist. Nat., Paris, 10:215—subgenus of *Mustela*; genotype by monotypy, *Mustela zorilla* I. Geoffroy = *Mustela zorilla* G. Cuvier; G. Cuvier, 1829, Dict. Sci. Nat., Paris, 59:499—full genus; Gray, 1869, Catalogue of carnivorous, pachydermatous, and edentate Mammalia, British Mus. (Nat. Hist.), p. 139—part; Trouessart, 1897, Cat. Mamm., p. 258—part; Hersh-

- kovitz, 1949, *Journ. Mamm.*, 30:295—generic name valid for African polecats.
- Ictonyx* Kaup, 1835, *Das Thierreich*, 1:352—genotype by monotypy, *Ictonyx capensis* Kaup = *Zorilla zorilla zorilla* G. Cuvier. Howell, *Proc. Biol. Soc. Washington*, 19:46—"Zorilla" Oken not valid, replaced by *Ictonyx* Kaup; Ellerman, Morrison-Scott, Hayman, 1953, *Southern African mammals 1758 to 1951: A reclassification*, British Mus. (Nat. Hist.), p. 111—classification, synonymy, distribution.
- Rhabdogale* Weigmann, 1838, *Arch. Naturg.*, Jahrg. 4, 1:287, footnote 9—genotype, "die Zorillen Afrika's;" Wagner, 1841, *Schreber's Säugthiere*, supply. 2:217—designated genotype, *Rhabdogale mustelina* Wagner = *Zorilla zorilla zorilla* G. Cuvier.

*Zorilla zorilla zorilla* G. Cuvier

- Mustela zorilla* G. Cuvier, 1798, *Tabl. Élém. Nat. Hist.*, p. 116—original description of "le zorille, ou putois du Cap."
- Bradypus striatus* Perry, 1810, *Arcana*, or *The Museum of Natural History*, pt. 2, zoology, text and pl. 41—"exhibited alive in London . . . and is reported to have been found in South America;" Hollister, 1915, *Proc. Biol. Soc. Washington*, 28:184—type locality, of *Bradypus striatus* Perry designated Cape of Good Hope.
- Ictonyx striatus striatus* G. M. Allen, 1939, *Bull. Mus. Comp. Zool.*, 88:179—synonyms: *striatus* Perry, *capensis* Smith, *capensis* J. B. Fischer, *africana* Lichtenstein, *mustelina* Wagner, *variegata* Lesson *zorilla* Trouessart; Ellerman, Morrison-Scott, Hayman, 1953, *Southern African mammals 1758 to 1951: A reclassification*, British Mus. (Nat. Hist.), p. 112—synonyms: *striatus* Perry, *capensis* Smith, *zorilla* Smuts, *africana* Lichtenstein, *mustelina* Wagner, *pondoensis* Roberts.

Currently recognized subspecies of *Zorilla zorilla* are: *Z. z. limpoensis* Roberts, *Z. z. maximus* Roberts, *Z. z. orangiae* Roberts, *Z. z. pretoriae* Roberts, *Z. z. arenarius* Roberts, *Z. z. ghanziensis* Roberts, *Z. z. shortridgei* Roberts, *Z. z. lancasteri* Roberts, *Z. z. kalaharicus* Roberts, *Z. z. giganteus* Roberts, *Z. z. ovamboensis* Roberts, *Z. z. albescens* Heller, *Z. z. elgonis* Granvik, *Z. z. erythrae* De Winton, *Z. z. intermedius* Anderson and De Winton, *Z. z. obscuratus* de Beaux, *Z. z. senegalensis* J. B. Fischer (includes *Mustela zorilla* E. Geoffroy, 1803), *Z. z. shoen Thomas*, *Z. z. sudanicus* Thomas and Hinton.

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A NEW REED VOLE, GENUS *MICROTUS*, FROM  
CENTRAL KOREA

BY J. KNOX JONES, JR.<sup>1</sup> AND DAVID H. JOHNSON<sup>2</sup>

The study of a collection of mammals from Korea has revealed the existence in the central part of that peninsula of an undescribed vole of the species *Microtus fortis*. This study is being carried out at the United States National Museum in cooperation with the Commission on Hemorrhagic Fever of the Armed Forces Epidemiological Board and the Army Medical Service Graduate School.

All measurements are in millimeters. Capitalized color terms are from Ridgway (Color standards and color nomenclature, Washington, D. C., 1912).

***Microtus fortis uliginosus*, new subspecies**

*Type*.—Adult female in summer pelage, skin and skull, United States National Museum no. 298078, from Chip'o-ri (38° 08' N, 127° 19' E), Korea; obtained 28 August 1952 by William H. Lawrence, original no. B-12098.

*Distribution*.—Known only from a restricted area in central Korea bounded by Kumhwa and Ch'orwon on the north and the 38th Parallel of latitude on the south.

*Diagnosis*.—Size large; upper parts glossy, Olive Brown; skull large and massive; auditory bullae and cheekteeth large.

*Description*.—Size large for species (see measurements). Color: Upper parts (summer pelage) glossy and averaging overall near Olive Brown (individual hairs entirely blackish or banded subterminally with near Ochraceous-Buff); sides more suffused with ochraceous than back; underparts grayish-white, usually faintly tinged with buff; ears dark brownish; feet brownish above, paler on inner sides (over metatarsals of first and second digits) and below; tail distinctly bicolor, blackish-brown above, grayish-white below. Skull: Large and massive (see measurements); nasals expanded anteriorly; infraorbital canals narrow when viewed from the front; zygomatic arches distinctly bowed, though rather straight in jugal region, and relatively massive; skull deepest over anterior parts of orbits; auditory bullae and cheekteeth large.

*Measurements*.—External measurements of the type specimen, followed by average and extreme external measurements of four other adult females from the type locality, are, respectively: Total length,

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211, 206.0 (197-215); length of tail vertebrae, 62, 57.7 (55-61); length of hind foot, 24, 24.2 (21-27); length of ear from notch, 15, 15.5 (14-17). Average and extreme external measurements of five adult males from the type locality are as follows: Total length, 207.8 (193-223); length of tail vertebrae, 64.2 (57-70); length of hind foot, 24.4 (23-26); length of ear from notch, 16.4 (15-18). For cranial measurements see Table 1.

*Comparisons.*—From *Microtus fortis pelliceus* of Manchuria and southeastern Siberia (specimens from Sungari River, 60 miles southwest of Kirin, Manchuria, and the type specimen which was examined by Johnson at the British Museum but is not at hand as we write), *M. f. uliginosus* differs in: Upper parts, in general, more suffused with ochraceous and having a slightly lighter and somewhat more olivaceous appearance; winter pelage shorter and seemingly less dense; underparts slightly lighter, usually faintly tinged with buff; upper surfaces of hind feet paler on inner margins rather than wholly dark; tail averaging paler below; skull larger in most dimensions (see Table 1) and more massive; nasals more expanded anteriorly; infraorbital canals narrower when viewed from the front; auditory bullae and cheekteeth larger. From *Microtus fortis calamorum* of northeastern China (specimens from Yochow, Hunan), *M. f. uliginosus* differs in: Upper parts distinctly darker (less buffy) and more glossy in appearance; tail darker above; underparts more buffy; skull conspicuously larger and more massive.

*Remarks.*—*Microtus fortis uliginosus* most closely resembles *M. f. pelliceus* among named subspecies. Externally it differs from *pelliceus* only slightly in color and size, but it averages larger than that subspecies in a number of cranial dimensions. At present the new subspecies is known only from a restricted area in central Korea just north of the 38th Parallel of latitude. It occurs there in lowland habitats, principally along stream banks and in abandoned paddy fields.

Kuroda (Jour. Mamm., 15:231, 1934) reported *M. f. pelliceus* from Bambo and near Yuki in extreme northeastern Korea. The records herein enumerated for the new subspecies extend the known range of the species southward on the Korean peninsula nearly 400 miles. For additional cranial measurements of *M. f. pelliceus*, see Tokuda (Bull. Biogeog. Soc. Japan, 4:139-140, 1941).

*Specimens examined.*—Seventy-five, all from Korea, as follows: Chip'o-ri, 43 (USNM 294651-59, 294661-63, 298070-72, 298078-89, 298958, 299509-15, 300647, 301252-53, 301256; Mus. Nat. Hist., Univ. Kansas, 60442, 63839-41; Mus. Zool., Univ. Michigan, 99592); 1½ mi. NW Chip'o-ri, 140 meters, 1 (Mus. Nat. Hist., Univ. Kansas, 60437); 2 mi. N Chip'o-ri, 150 meters, 1 (USNM 298959); 3 mi. NW Chip'o-ri, 145 meters, 6 (USNM 298961-63, 299096-97; Mus. Nat. Hist., Univ. Kansas, 60443); Ch'ongyang-ni, 8 (USNM 294660, 294664, 298090-93, 298099-100); Ch'onsong-ni, 1 (USNM 298094); Kumhwa, 6 (USNM 294665-66, 298096-98; Nat. Sci. Mus. Japan, 1 specimen); Taegwang-ni, 90 meters, 2 (USNM 301255; Mus. Nat. Hist., Univ. Kansas 60440); Ugu-dong, 3 (USNM 298957, 298960, 301254); White Horse Mt., near Ch'orwon, 1 (Mus. Comp. Zool., Harvard, 47136); Yonch'on, 1 (USNM 301257); Yongp'yong, 110 meters, 1 (Mus. Nat. Hist., Univ. Kansas, 60441).

TABLE 1. Cranial measurements of two subspecies of *Microtus fortis*.

|                                                                               | Condylobasal<br>length | Oecipitonasal<br>length | Palatal<br>length | Zygomatic<br>breadth | Breadth across<br>auditory bullae | Interorbital<br>breadth | Length of<br>nasals | Length of in-<br>cursive foramina | Alveolar length<br>of upper molar-<br>form tooththrow |
|-------------------------------------------------------------------------------|------------------------|-------------------------|-------------------|----------------------|-----------------------------------|-------------------------|---------------------|-----------------------------------|-------------------------------------------------------|
| <i>Microtus fortis pelliceus</i> , Ussuri River, southeastern Siberia.        |                        |                         |                   |                      |                                   |                         |                     |                                   |                                                       |
| BM 91.6.29.2, ♂ (type)                                                        | ---                    | 29.6                    | 18.6              | ---                  | ---                               | 4.2                     | 9.1                 | 5.7                               | ---                                                   |
| <i>Microtus fortis pelliceus</i> , Sungari River, 60 mi. SW Kirin, Manchuria. |                        |                         |                   |                      |                                   |                         |                     |                                   |                                                       |
| USNM 197863, ♂                                                                | 32.2                   | 30.9                    | 19.1              | 17.9                 | 14.8                              | 4.2                     | 8.7                 | 6.0                               | 7.8                                                   |
| USNM 197860, ♀                                                                | 31.9                   | 31.3                    | 18.9              | 17.6                 | 14.5                              | 4.1                     | 8.7                 | 6.4                               | 8.3                                                   |
| <i>Microtus fortis uliginosus</i> , Chip'ori, Korea.                          |                        |                         |                   |                      |                                   |                         |                     |                                   |                                                       |
| USNM 298078, ♀ (type)                                                         | 33.2                   | 32.5                    | 19.3              | 18.3                 | 15.0                              | 4.4                     | 8.9                 | 6.0                               | 7.9                                                   |
| Average 4 ♀                                                                   | 33.4                   | 32.6                    | 19.7              | 18.8                 | 14.9*                             | 4.4                     | 9.2                 | 6.0                               | 8.4                                                   |
| Minimum                                                                       | 32.8                   | 32.4                    | 19.2              | 18.4                 | 14.5                              | 4.4                     | 8.7                 | 5.7                               | 7.9                                                   |
| Maximum                                                                       | 34.0                   | 33.2                    | 20.2              | 19.7                 | 15.6                              | 4.5                     | 9.5                 | 6.3                               | 9.0                                                   |
| Average 5 ♂                                                                   | 34.4                   | 33.1                    | 19.9              | 18.7                 | 15.1                              | 4.5                     | 9.1                 | 6.3                               | 8.4                                                   |
| Minimum                                                                       | 33.9                   | 32.2                    | 19.5              | 18.4                 | 14.6                              | 4.3                     | 8.5                 | 5.9                               | 8.1                                                   |
| Maximum                                                                       | 35.0                   | 33.6                    | 20.2              | 19.2                 | 15.4                              | 4.7                     | 9.6                 | 6.5                               | 8.7                                                   |

\*Three specimens





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THREE NEW SPECIES OF *CINARA* (APHIDAE)

BY F. C. HOTTES

It is a pleasure to acknowledge the assistance of Dr. L. G. Gentner, Prof. Carl Johansen and Mr. M. J. Forsell who sent me material for one of the new species described herewith.

*Cinara caliente* n. sp.

*Apterous viviparous female.*

Size and color.—Length from vertex to end of anal plate varying from 2.02-2.17 mm. Width of head through eyes .47 mm.. Head dusky-gray if no powder is present, if with powder, dusky, mottled with powder, the powder not being uniform in distribution. Mid dorsal region of thorax black, lateral regions of thorax with much powder and almost white. Black portion of prothorax narrow, that of mesothorax somewhat wider, that of metathorax still more extensive and as a rule more or less split in the mid posterior region. First abdominal segment black, except for median region. Sometimes the black on the thorax and the first abdominal segment gives the appearance of an inverted V, the arms of which extend lateral to the abdomen. Remainder of abdomen except for cornicles which are black, dusky-gray more or less mottled with powder, the dusky being more abundant between the cornicles, and extending from them in an irregular pattern towards the middle. First and second antennal segments dusky, base of third, fourth and fifth antennal segments white, with the tips of the segments light dusky, all of the sixth antennal segment dusky. Femora with proximal region white, remainder dusky. Tibiae with short dusky region near base followed by a clear area to about the middle, remainder of tibiae dusky.

Head and thorax.—Antennal segments with the following lengths: III .27-.32 mm., IV .10-.13 mm., V .17 mm. VI .09 + .02-.03 mm. Sensoria distributed as follows: III 0-1 almost always none, IV none, V 1 with primary sensorium always present. Antennal hair very sparse, rather spine-like, less than half width of segment in length. All antennal segments except the extreme tip of the sixth smooth. Hairs on anterior portion of head slightly longer than on the third antennal segment, of the same type and rather sparse. Marginal sensoria on sixth antennal segment small, few in number and often difficult to determine. Ocular tubercles present but very small, much rounded. Rostrum when extended reaching beyond metathorax, in a few cases almost reaching the anterior portion of the cornicles. Hair on femora short, almost spine-like. Hind tibiae 1.29 mm. in length. Hair on hind tibiae slightly longer than width of tibiae on outer margin slightly shorter than width on inner, rather sparse, and spine-like, set at an angle of

about forty-five degrees. Hair at apex of tibiae longest. First tarsal segment with about eight hairs on the ventral surface, these are located on the apical half of the segment, these hairs are rather short. Hairs on dorsal surface of second tarsal segment fewer and longer than those on the ventral surface, they are also more spine-like.

Abdomen.—Dorsum of abdomen with a few short spine-like hairs, hairs on ventral surface numerous, longer and finer than those on the dorsum. Dorsum of abdomen with a few small irregular shaped pigment spots, these show no particular arrangement and vary in size. These spots are more or less wrinkled and suggest the pigmented spots on the dorsum of *C. laricis* (Hartig) except for size, the larger spots as a rule have two hairs, the smaller ones one. Hair on the dorsum is not confined to the pigmented spots, in length it is about .02 mm. or only slightly more. Outer base of cornicles very irregular, varying from .20-.25 mm. Cornicles provided with very few hairs, in most cases not more than six, rarely eight, and often as few as four, these may be as short as those on the dorsum of the abdomen, or slightly longer. Transverse pigmented areas anterior to cauda very irregular in outline more or less united, and with about three hairs on each half. Hairs on cauda confined largely to outer margin.

*Alate viviparous female.*

This form which varies from 1.80-2.10 mm. in length is suggestive of the apterous viviparous female in color of head and abdomen. The thoracic lobes are gray or more or less white if provided with powder, the powder being as a rule rubbed on the edges of the lateral lobes. Secondary sensoria with the following distribution: III zero—2, IV zero to 1, V 1. The third antennal segment always with a primary sensorium, this may be present or lacking on the fourth antennal segment, so that this segment may be without sensoria, fifth segment with primary sensorium. Media of fore wings two branched, the second branch closer to the margin of wing than to the first branch. Veins pale. Hind tibiae about 1.45 mm. in length. Hairs on hind tibiae longer than those of apterous viviparous female, and slightly more numerous. Lateral portions of lateral thoracic lobes free from hair. Anterior median thoracic lobe free from hairs, posterior thoracic lobe with only a few. Dorsum of abdomen free from pigmented spots. Transverse pigmented spots anterior to cauda very small divided, with three or four hairs on the posterior margin.

*Oviparous female.*

Similar to apterous viviparous female except for region posterior to cornicles which has a heavy coat of powder, this may extend forward in the mid dorsal region to the middle of the cornicles, and in some few cases extend to and slightly cover the posterior margin of the cornicles. The hind tibiae are only slightly swollen, the sensoria on them extend the full length of the tibiae, but are not numerous. The cornicles of this form have a smaller base than the viviparous females, and the dorsum of the abdomen is almost free from pigmented spots, the few present being extremely small.

*Alate male.*

Head and thorax dusky, older specimens have little powder, the

higher regions of the thoracic lobes being almost shining, the median thoracic lobe alone with heavy powder. Abdomen more or less greenish-gray, with some powder through which some dusky areas show. Mounted specimens show no pigmented spots on the dorsum of the abdomen. Length from vertex to end of anal plate about 2.10 mm. Secondary sensoria distributed as III 24-27, IV 5-7, V 4-6, VI 0-1.

In Palmer's key to the genus *Cinara* in "Aphids of The Rocky Mountain Region" this species keys to *C. atra* G&P. *C. caliente* differs greatly from *C. atra*, and it is necessary to mention only a few outstanding differences. *C. atra* is without powder, is black and shining, the first tarsal segment has extremely long somewhat curved or bent hairs on the ventral surface, the male is apterous, the fourth rostral segment is longer, and the alate viviparous female has more secondary sensoria on the third antennal segment.

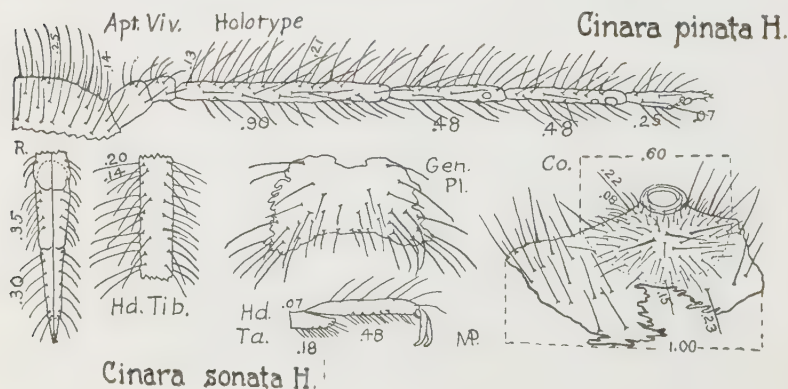
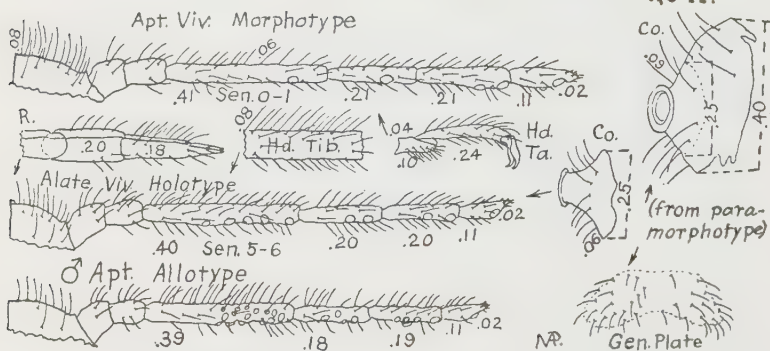
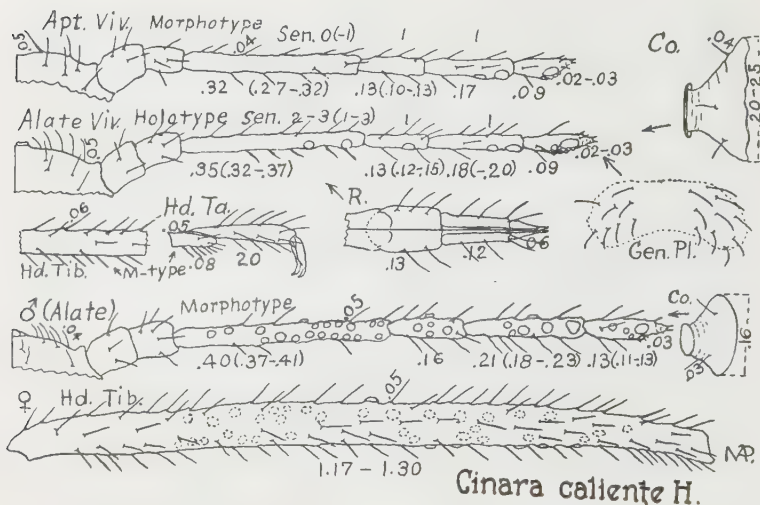
This species was first taken on two atypic much stunted trees of *Pinus edulis*. The terminal branches of which were extremely long and very very thin, and free from needles for long distances. The specimens being taken on the needle free areas in small groups. It was taken on no other trees, and was reared on the branches of other trees only with great difficulty and high mortality, after becoming established on the new host branches, equal difficulty was experienced, when the specimens were transferred to branches of the original host. Type locality seventeen miles south west of Delta, Colorado, on the road to Twenty-five Mile Mesa. Holotype, morphotypes and allotype reared in Grand Junction, Colorado on original material.

Holotype, alate viviparous female Aug. 15, 1955, morphotype, apterous viviparous female Aug. 12, 1955, morphotype, oviparous female Sept. 26, 1955, allotype, alate male Sept. 17, 1955, all reared in Grand Junction, Colorado. All types deposited in the United States National Museum.

*Cinara pinata* n. sp.

*Apterous viviparous female.*

Size and color, head.—Length of body from vertex of head to end of anal plate varying from 2.97-3.36 mm. Head and thorax dark dusky-brown with just a trace of powder. Dorsum of thorax with two small black spots to each segment. Dorsum of abdomen varying with season, in summer, deep brown to almost bronze, when thus, with a yellowish mid dorsal line and free from powder. In fall darker brown to deep dusky-brown, when thus with a median somewhat broken line of powder, and with a small patch of powder anterior to each cornicle, this powder may be only a small dash. Cornicles very dark brown and shining. Between the cornicles there are two L shaped areas back to back, these are dull black, and are separated from each other either by the yellowish line or the line of powder. The rest of the dorsal surface of the abdomen is only moderately polished and rather rough, mounted specimens show this surface reticulated. First and second antennal segments similar to head. Third antennal segment yellowish except for apex which is dusky. Fourth and fifth antennal segments with basal half or more yellowish, remainder dusky. Sixth segment dusky. Sensoria with following distribution: III 0-1 the sensorium if present is small, and may not be primary, IV 0-2, if only one sensorium is present it is apt to be





far removed from the apex, V 2, the primary sensorium on this segment is large and has a wide rim. The primary sensorium on the sixth segment is large, has a wide rim, the marginal sensoria are few in number, have wide rims and are far removed from the primary. Unguis of sixth segment very short. Hair on antennae numerous rather upstanding about .06 mm. in length, the longest being just longer than the width of segment. Hair on sixth segment numerous for this segment. Length of antennal segments as follows: III .41 mm., IV .15-.24 mm., V .17-.25 mm., VI .1 + .02 mm. Width of head through the eyes .67-.71 mm. Hair on dorsum of head .06-.08 mm. in length. Median suture of head narrow. Ocular tubercles moderately well developed. Extended rostrum reaching to or slightly beyond cornicles.

Thorax.—Mesosternal tubercle present but not well developed. Femora dusky-brown except for region near body which is yellowish. Tibiae with extreme base dusky, this area is followed by a yellowish region and this in turn is followed by dusky, the yellowish area is more extensive on the pro and mesothoracic tibiae than on the metathoracic tibiae. Hair on hind tibiae numerous, curved from the middle downwardly, about .06 mm. in length on the outer margin and less on the inner. Length of hind tibiae 1.93-2.14 mm. First tarsal segment .11 mm. in length, second tarsal segment .24-.26 mm. in length. The first tarsal segment has about twenty hairs on the ventral surface. The ventral surface of the second tarsal segment has the hairs more numerous than those on the dorsal surface, these hairs are also slightly shorter than the hairs on the dorsum of this segment.

Abdomen.—Base of cornicles varying from .25-.40 mm. Outer margin of cornicles very irregular, mounted specimens show the cornicles two toned, the rim being much darker than the base. Hair on cornicles few, most numerous on the darker area. The dorsum of the abdomen has few hairs. The dorsum of the abdomen is reticulated, the reticulations are very small and very fine. Transverse pigmented spots large, provided with a row of long fine hairs on the posterior margin, anterior to these there are two irregular shaped much broken pigmented spots, these have a few short spine-like hairs. The cauda is pale at the base, the hair being restricted to the posterior margin.

*Alate viviparous female.*

Color not observed when alive. Length from vertex to end of anal plate 2.9 mm. Antennal segments with the following lengths: III .40-.44 mm., IV .19-.23 mm., V .21-.27 mm., VI .1-.11 + .02-.03 mm. Sensoria distributed as follows: III 3-5 secondary in a row plus primary sensorium, IV none to one secondary plus primary, V one plus primary. Length of hair on third antennal segment varying from .05-.07 mm. rather numerous and upstanding. Width of head through the eyes .65-.70 mm. Rostrum reaching almost to end of abdomen. Hind tibiae varying from 2.1-2.4 mm. Hair on hind tibiae numerous about .08 mm. in length, fine and sharp-pointed, rather more numerous towards the apex. Width of base of cornicles .26-.30 mm. Media of fore wings twice branched the second branch about mid way between the first and the margin of the wing. The media of the holotype is not typical.

*Oviparous female.*

This form is quite similar to the apterous viviparous female, as a rule specimens are darker in color, but have no more powder, the mid line of powder on the dorsum may be lacking. The basal half of the hind tibiae is quite swollen and it is on this half that most of the sensoria are confined, few if any extending beyond the middle. The sensoria even on the basal half are extremely difficult to differentiate, but are numerous if not typical.

*Apterous male.*

In color this form is similar to immature females, being gray with patches of powder in front of cornicles. It is 2.17 mm. in length. The antennal segments have the following lengths: III .39, IV .18 mm., V .19 mm., VI .11 + .02 mm. Secondary sensoria distributed as follows: III 13-17, IV 5, V 1-2. The primary sensorium on the third antennal segment is small, the primary sensoria on the fourth and fifth segments are normal in size. Care must be used to differentiate the secondary sensoria on the third segment from the base of the hairs, the two being of the same size and color.

This species was collected on *Pinus edulis*. On this host it feeds on the bark of four or five year old branches and in a few cases on branches which are younger. The colonies are always small, apparently new colonies are established when the colonies cover about an inch of branch.

I suspect that this species is most closely allied to *C. pinona* H. From *pinona* it differs in the following respects to mention only a few, the unguis is very much shorter, the antennae have more hair, the hair on the tibiae are less abundant also less drooping.

Holotype, alate viviparous female Aug. 2, 1955, Morphotype, apterous viviparous female Aug. 25, 1955, Morphotype, oviparous female Oct. 5, 1955, Allotype, apterous male September 29, 1955. All types taken on type tree, growing just north of the parking area adjacent to the picnic grounds of the Colorado National Monument, Fruita, Colorado. All types deposited in the United States National Museum. Numerous specimens were reared on branches.

***Cinara sonata* n. sp.***Apterous viviparous female.*

Size and general color.—Length from vertex to end of anal plate varying from 5.25-7 mm. Dr. Louis G. Gentner, of the Southern Oregon Branch Experiment Station, Medford, Oregon, who collected some of the specimens from which this species is described, kindly supplied the following color notes "Dull reddish-brown, with darker appendages, and with black markings on dorsum and a black blotch around each cornicle." The first antennal segment is concolorous with the head, the second segment is not quite so dark, the third and fourth antennal segments are yellowish except for the apical portions of the segment, which are dusky, the dusky area on the fourth segment being the most extensive. The fifth and sixth antennal segments have the dusky area equal to about half of the segment. The femora are black except for the extreme basal portion. The prothoracic tibiae are black throughout,



the meso and metathoracic tibiae are black, however some specimens show a very dark brownish area a short distance below the basal end, this area is always short. The tarsi are black. The cornicles are black.

Head and thorax.—Antennal segments with the following lengths: III .75-1.05 mm., IV .40-.48 mm., V .45-.58 mm., VI .225-.27 mm. + .07 mm. The third antennal segment is without sensoria, the fourth antennal segment may lack secondary sensoria, or have one or two, all sensoria on this segment are small. The fifth antennal segment has one secondary sensorium and the primary. Antennal hair numerous, upstanding, that on anterior margin of third segment more abundant than that on posterior margin of segment, and about .20-.21 mm. in length. Only the sixth antennal segment imbricated. Hind tibiae about 4.00 mm. in length. Hair on hind tibiae numerous, upstanding varying on outer margin from .14-.20 mm. in length. Hair on inner margin of hind tibiae more numerous, finer and shorter than hair on outer margin, also less upstanding. First tarsal segment about .18 mm. in length, ventral surface with numerous hairs, these are difficult to count, but number more than twenty and in one case twenty-seven. The meso-sternal tubercle is absent.

Abdomen.—Cornicles with the base very irregular and deeply and irregularly indented on both sides. The base of the cornicles measure from .90-1.00 mm. the long way. The cornicles are provided with numerous hairs, which vary in length from .08-.22 mm. in length. The longest hairs being spine-like, the other hairs of which there are about two lengths are much finer, the shortest hair being the finest, and confined for the most part to the constricted area of the cornicle. The dorsum of the abdomen has many hairs, these are of various lengths and character, the longest being about .16 mm. in length, the shortest and finest about .105 mm. in length. The dorsum of the abdomen has numerous pigmented spots, these are the largest posterior to the cornicles. The pigmented spots are without arrangement, vary greatly in size, and shape, most have hairs. Pigmented spots anterior to the cauda with two rows of long hairs along the posterior margin. Hairs confined to posterior margin of cauda.

This species is most closely allied to *Cinara abieticola* (Chol.) and differs from specimens of that species collected in Europe and America as follows: The pigmented spots on the dorsum of the abdomen are smaller and are not arranged in two rows, the cornicles are larger, and are deeply indented along the outer margin, the outer margin of the cornicle is very irregular, the tarsal segments are much longer, the first tarsal segment has more hairs on the ventral surface.

All specimens of this species were collected on *Abies*. Holotype, taken on *Abies grandis*, Priest Lake, Idaho, Aug. 28, 1954 by Prof. Carl Johansen of the Department of Entomology, State College of Washington. Paratypes as follows: *Abies magnifica* var. *shastensis* L. G. Gentner, Mt. Ashland, Oregon Sept. 2, 1954, *Abies concolor*, M. J. Forsell, Seattle, Washington, Aug. 20, 1955, and L. G. Gentner, Mt. Ashland, Oregon Aug. 12, 1955, on *Abies magnifica* var. *shastensis*. Holotype deposited in the United States National Museum.



# INDEX

New names are printed in heavy type.

## A

- abdominalis, *Pipromorpha*  
oleaginea 55, 56, 57  
*Abies concolor* 203  
    *grandis* 203  
    *lasiocarpa* 69  
    *magnifica shastensis* 63, 203  
*abieticola*, *Cinara* 203  
*absonus*, *Thomomys bottae* 79, 80, 81  
*aculeatus*, *Euryurus* 23  
    *Eutheatus* 23  
*acutissimus*, *Procambarus* 98  
*adela*, *Apheloria* 25  
*africana*, *Ictonyx striatus* 190  
*alaska*, *Cheiletha* 180  
*albescens*, *Zorilla zorilla* 190  
*albicollis*, *Platyrrhynchus* 42  
    *Rhipidura albicollis* 41, 42, 43, 44, 45, 46  
*albigularis*, *Glyphorhynchus*  
    *spirus* 116  
*albugularis*, *Platyrrhynchus*  
    *mystaceus* 117  
*alexandrinus*, *Mus* 189  
    *Rattus rattus* 189  
*alysii*, *Thrips* 59  
*Alysium*, *floridana* 59  
*amacurensis*, *Glyphorhynchus*  
    *spirus* 116  
***amazonicus***, *Eumops* 177, 178  
*amethysticollis*, *Heliangelus* 50  
*Amphoeir reducta* 90, 92, 94  
    *sequoia* 92  
*Anous stolidus* 48  
*Anthreptes singalensis as-*  
    *samensis* 147  
    *internotus* 147  
    *interpositus* 147  
*antioquiae*, *Piprites chloris* 55  
*aoki*, *Micromys minutus* 169  
***apacheca***, *Cinara* 65, 66, 70  
*Apheloria* 24  
    *adela* 25  
    *pinicola* 25  
*Apodemus agrarius chejuen-*  
    *sis* 171, 172  
    *coreae* 170  
    *manchuricus* 170, 171, 172  
    *pallascens* 169, 170, 171  
    *pallidior* 170, 171, 172  
*Aporobolus* 154  
*arenarius*, *Zorilla zorilla* 190  
*arizonica*, *Cinara* 66  
*assamensis*, *Anthreptes*  
    *singalensis* 147  
*assimilis*, *Pipromorpha olea-*  
    *ginea* 57  
    *ginea* 57  
*Atlapetes personatus collaris*  
    *duidae* 121, 122  
    *jugularis* 121, 122  
    *paraquensis* 122  
    *parui* 121, 122  
    *personatus* 121, 122  
*Atopulus chamberlini* 89, 94  
*Atractus badius* 14  
    *bocourti* 12, 14  
    *collaris* 11, 13, 14, 18  
    *duboisii* 11, 17, 18, 19  
    *dunni* 13, 14, 15, 16, 18  
    *ecuadorensis* 13, 15, 16, 17, 18  
    *gaigeae* 12, 14, 15, 16, 19  
    *occidentalis* 13, 15, 16, 17  
    *maculatus* 14  
    *occipitoalbus* 18  
    *orcesi* 17, 18, 19  
    *trilineatus* 11, 16, 18  
*atrata*, *Rhipidura albicollis* 43, 44, 45, 46  
*atricilla*, *Larus* 48  
    *Larus atricilla* 113  
*Auturus evides* 22  
    *florus* 22  
    *louisiana* 22  
    ***mcclurkini*** 23, 27  
*Auxobolus ergus* 88

## B

- Bactropus* 130, 135  
    *cystopomati* 135  
*badianus*, *Atractus* 14  
***badius***, *Pachyrhamphus cin-*  
    *namomeus* 45, 55  
*Baker, Rollin H.*  
    A New Species of Bat  
    (Genus *Myotis*) from  
    Coahuila, Mexico 165-166  
*barberi*, *Eutamias sibiricus* 175, 176  
*barnesi*, *Ochotona princeps* 6, 7, 8, 9, 10  
*barrios*, *Eurhinocricus* 32  
*bassi*, *Scalopus aquaticus* 37  
*Bdellozonium sequoium* 87  
*beebei*, *Rhodinocichla rosea* 58  
*bengalensis*, *Centropus* 145, 146  
*berlepschi*, *Myrmeciza im-*  
    *maculata* 33  
    *Xiphocolaptes promero-*  
    *pirhynchus* 115  
*biermani*, *Trichoduchus* 125, 126  
*bifasciatus*, *Platyrrhynchus*  
    *mystaceus* 117  
*bimaculata*, *Epeloria* 24  
    *Spathoria* 24  
    *Polydesmus* 24  
*biolleyi*, *Eurhinocricus* 31, 32, 33  
    *Rhinocricus* 33  
*Blake, S. F.*, elected record-  
    ing secretary ix  
*Blarina brevicauda caro-*  
    *linensis* 37, 39  
    *peninsulae* 37, 39  
    ***shermani*** 37, 39  
*bocourti*, *Atractus* 12, 14  
*Bollmaniulus* 88  
*bonariensis*, *Eumops* 178  
*Bond, Gorman M.*, elected  
    corresponding secretary ix  
*Brachoria electa* 25, 27, 28  
    *ethotela* 25, 27  
*Brachygybe producta* 87  
*Brady, Maurice K.*, elected  
    member of council ix

|                                                           |                         |                                                |                         |
|-----------------------------------------------------------|-------------------------|------------------------------------------------|-------------------------|
| <i>Bradypus striatus</i> .....                            | 189, 190                | <i>chinensis</i> , <i>Streptopelia chin-</i>   | 145                     |
| <i>brevipilosus</i> , <i>Eulachnus</i> .....              | 63                      | <i>ensis</i> .....                             | 67, 68                  |
| <b>brunnea</b> , <i>Myrmeciza immacu-</i>                 | 52, 53                  | <b>chinookiana</b> , <i>Cinara</i> .....       | 203                     |
| <i>lata</i> .....                                         | 183                     | <i>chloronota</i> , <i>Pipromorpha</i>         | 55, 56, 57              |
| <i>butleri</i> , <i>Jaculus jaculus</i> .....             |                         | <i>oleaginea</i> .....                         | 58, 121                 |
| C                                                         |                         |                                                |                         |
| <i>calaveras</i> , <i>Sigmocheir</i> .....                | 93, 94                  | <i>Chlorospingus canigularis</i>               | 27, 29                  |
| <b>calceata</b> , <i>Tucoria</i> .....                    | 27, 28                  | <i>canigularis</i> .....                       | 29                      |
| <b>caliente</b> , <i>Cinara</i> .....                     | 197, 199, 200           | <i>Cibularia profuga</i> .....                 | 203                     |
| <i>Californibolus pontis</i> .....                        | 88                      | <i>tuobita</i> .....                           | 65, 66, 70              |
| <i>uncigerus</i> .....                                    | 87, 88                  | <i>Cinara abieticola</i> .....                 | 66                      |
| <i>californicus</i> , <i>Myotis</i> .....                 | 165, 166                | <b>apacheca</b> .....                          | 197, 199, 200           |
| <i>Californiulus vicinus</i> .....                        | 89                      | <i>arizonica</i> .....                         | 67, 68                  |
| <i>yosemiteensis</i> .....                                | 89                      | <b>caliente</b> .....                          | 73, 74                  |
| <i>camara</i> , <i>Lantana</i> .....                      | 143                     | <b>chinookiana</b> .....                       | 66                      |
| <i>Cambarus cristatus</i> .....                           | 95, 99                  | <i>cognita</i> .....                           | 102                     |
| <i>fodiens</i> .....                                      | 95                      | <i>curvipes</i> .....                          | 74                      |
| <i>cancrominus</i> , <i>Platyrinchus</i>                  |                         | <i>difficilis</i> .....                        | 77                      |
| <i>mystaceus</i> .....                                    | 118                     | <i>engelmanniensis</i> .....                   | 74, 77                  |
| <i>canescens</i> , <i>Leucocirca albi-</i>                |                         | <i>enigma</i> .....                            | 62                      |
| <i>collis</i> .....                                       | 41                      | <i>fornacula</i> .....                         | 101                     |
| <i>Rhipidura albicollis</i> 41, 42, 43, 45, 46            |                         | <i>glabra</i> .....                            | 70, 75                  |
| <i>canigularis</i> , <i>Chlorospingus</i> .....           | 58, 121                 | <i>hirsuta</i> .....                           | 76                      |
| <i>Tachyphonus</i> .....                                  | 58, 121                 | <i>hottesi</i> .....                           | 102, 103                |
| <i>capensis</i> , <i>Ictonyx striatus</i> .....           | 190                     | <i>hyalinus</i> .....                          | 102                     |
| <i>carinata</i> , <i>Phyllonotocheila al-</i>             |                         | <i>juniperi</i> .....                          | 68, 69, 73              |
| <i>berti</i> .....                                        | 105                     | <i>juniperivora</i> .....                      | 72                      |
| <i>carolinensis</i> , <i>Blarina brevi-</i>               |                         | <i>lasiocarpae</i> .....                       | 72                      |
| <i>cauda</i> .....                                        | 37, 39                  | <i>nimbata</i> .....                           | 72                      |
| <i>Cascya sequoia</i> .....                               | 90                      | <i>nitidula</i> .....                          | 77                      |
| <i>castanea</i> , <i>Mimuloria</i> .....                  | 30                      | <i>obscura</i> .....                           | 101                     |
| <i>castaneus</i> , <i>Polydesmus</i> .....                | 30                      | <i>villosa parvavillosa</i> .....              | 76                      |
| <i>castelnaudi</i> , <i>Glyphorhynchus</i>                |                         | <i>piceicola</i> .....                         | 74, 76                  |
| <i>spirurus</i> .....                                     | 116                     | <i>pilicornis</i> .....                        | 199, 200                |
| <i>cauceae</i> , <i>Turdus olivater</i> .....             | 119, 121                | <i>pinona</i> .....                            | 104, 202                |
| <i>Casey</i> , <i>Nell B.</i>                             |                         | <i>puerca</i> .....                            | 68, 69                  |
| New Records and Descriptions of Polydesmoid Mil-          |                         | <i>schwarzii</i> .....                         | 66                      |
| lipeds (Order Polydesmida) from the East-                 |                         | <b>setulosa</b> .....                          | 61, 70                  |
| ern United States .....                                   | 21-30                   | <b>sonata</b> .....                            | 200, 202                |
| New Records and Descriptions of Californian Dip-          |                         | <i>tanneri</i> .....                           | 68                      |
| lopoda .....                                              |                         | <i>villosa</i> .....                           | 101                     |
| <i>cavicolens</i> , <i>Paeromopus</i> .....               | 87-94                   | <b>curtivillosa</b> .....                      | 102                     |
| 88, 94                                                    |                         | <i>wahhaka</i> .....                           | 103                     |
| <b>celadinus</b> , <i>Mülleripicus pul-</i>               |                         | <i>wahluca</i> .....                           | 103                     |
| <i>verulentus</i> .....                                   | 146, 147                | <i>wahtolca</i> .....                          | 101, 104                |
| <i>celsa</i> , <i>Rhipidura albicollis</i> 43, 44, 45, 46 |                         | <b>curtiwahtolca</b> .....                     | 101                     |
| <i>centrata</i> , <i>Malaclemys ter-</i>                  |                         | <i>cingendus</i> , <i>Eurhinocricus</i> .....  | 33                      |
| <i>rapin</i> .....                                        | 157, 158, 159, 160, 161 | <i>Rhinocricus</i> .....                       | 33                      |
| 162, 163, 164                                             |                         | <i>cinerascens</i> , <i>Rhipidura al-</i>      | 43, 45, 46              |
| <i>Centropus bengalensis</i> .....                        | 145                     | <i>bicollis</i> .....                          | 1, 3, 4, 6, 7, 9        |
| <i>toulou</i> .....                                       | 145                     | <i>cinnamomea</i> , <i>Ochotona prin-</i>      | 54                      |
| <i>bengalensis</i> .....                                  | 146                     | <i>ceps</i> .....                              | 9                       |
| <b>chamnongi</b> .....                                    | 146                     | <i>cinnamomeus</i> , <i>Pachyramphus</i>       | 2, 4, 5, 8              |
| <i>javanensis</i> .....                                   | 146                     | <i>cinnamomeus</i> .....                       | 25                      |
| <i>lignator</i> .....                                     | 146                     | <i>Citellus lateralis</i> .....                | 49                      |
| <i>molkenboeri</i> .....                                  | 146                     | <i>clamosa</i> , <i>Ochotona princeps</i>      | 87                      |
| <i>Chamberlin</i> , <i>Ralph V.</i>                       |                         | <i>clara</i> , <i>Fontaria</i> .....           | 25                      |
| Four New American                                         |                         | <i>clarisse</i> , <i>Heliangelus ame-</i>      | 49                      |
| Chilopods .....                                           | 179-182                 | <i>thysticollis</i> .....                      | 87                      |
| <i>chamberlini</i> , <i>Atopolus</i> .....                | 89, 94                  | <i>clarus</i> , <i>Eucybe</i> .....            | 25                      |
| <i>Paeromopus</i> .....                                   | 89                      | <i>clarus</i> , <i>Pachydesmus</i> .....       | 129, 131, 132, 137      |
| <b>chamnongi</b> , <i>Centropus toulou</i>                | 146                     | <i>cluthae</i> .....                           | 130, 134, 138           |
| <i>Cheiletha alaska</i> .....                             | 180                     | <i>lubbockii</i> .....                         | 130, 131, 133, 134, 138 |
| <b>kincaidii</b> .....                                    | 180                     | <i>Clausidium</i> .....                        | 137                     |
| <b>phoenix</b> .....                                      | 179                     | <i>cluthae</i> , <i>Clausia</i> .....          | 130, 134, 138           |
| <i>Cheiropus plancus</i> .....                            | 24                      | <i>coccinellae</i> , <i>Perilitus</i> .....    | 143                     |
| <b>chejuensis</b> , <i>Apodemus agra-</i>                 |                         | <i>cockerelli</i> , <i>Eurhinocricus</i> ..... | 33                      |
| <i>rius</i> .....                                         | 171, 172                | <i>Rhinocricus</i> .....                       | 33                      |
| <i>chichivacus</i> , <i>Eurhinocricus</i> .....           | 33                      | <i>cocos</i> , <i>Rhinocricus</i> .....        | 33                      |
| <i>china</i> , <i>Trichoduchus</i> .....                  | 126                     | <i>cognita</i> , <i>Cinara</i> .....           | 73, 74                  |
|                                                           |                         | <i>collaris</i> , <i>Atlapietes personatus</i> | 122                     |
|                                                           |                         | <i>Atractus</i> .....                          | 11, 13, 14, 18          |
|                                                           |                         | <i>coloratus</i> , <i>Oryzomys palustris</i>   | 83, 84, 85              |
|                                                           |                         | <i>communis</i> , <i>Juniperus</i> .....       | 73                      |

- Conchocheres* ..... 129, 130, 135  
*concolor*, *Abies* ..... 203  
*Conotyla* ..... 90  
*conservata*, *Delocheir* ..... 90, 93  
**cooki**, *Xystocheir* ..... 90, 91, 94  
*coreae*, *Apodemus agrarius* ..... 170  
*coronobscurus*, *Glyphorhynchus* ..... 115, 116  
*coryi*, *Felis concolor* ..... 149, 150  
*costaricensis*, *Xiphocolaptes promeropirhynchus* ..... 115  
*Zonotrichia capensis* ..... 123  
*Cranioleuca subcristata fuscivertex* ..... 50  
*subcristata* ..... 51  
*crassirostris*, *Xiphocolaptes promeropirhynchus* ..... 115  
**cristatus**, *Cambarus* ..... 95, 99  
*Cryptotis* ..... 38  
*Cubobolus* ..... 32  
*gossei* ..... 34  
*cuneatus*, *Glyphorhynchus spirurus* ..... 117  
*curtivillosa*, *Cinara villosa* ..... 102  
**curtiwahtolca**, *Cinara wahtolca* ..... 101  
*curvipes*, *Cinara* ..... 66  
*cylindraceus*, *Tococheres* ..... 136  
*cystopomati*, *Bactropus* ..... 135
- D**
- davidcauseyi*, *Mimuloria* ..... 30  
*Nannaria* ..... 30  
*decolor*, *Heliangelus amethysticollis* ..... 50  
**Deignan**, H. G. ..... ix  
*Adventures in Thailand* .....  
*Four New Races of Birds from East Asia* ..... 145-148  
*Delocheir conservata* ..... 90-93  
*Dendrocina homochroa meridionalis* ..... 50  
*ruficeps* ..... 50  
*difficilis*, *Cinara* ..... 102  
*dilutus*, *Platyrinchus mystaceus* ..... 118  
*dilatata*, *Phyllontocheila* ..... 105, 106  
*Tingis* ..... 106  
*dissimilis*, *Thomomys bottae* ..... 80, 81  
*Donusa* ..... 133  
*dorsalis*, *Pipromorpha oleagina* ..... 55, 57  
*dougallii*, *Sterna dougallii* ..... 113  
**Drake**, Carl J. ....  
*Some Tingidae from the French Cameroons* ..... 105-108  
*(Hemiptera)* .....  
*Two New Species of Shore-Bugs (Hemiptera) (Saldidae: Leptopodidae)* ..... 109-112  
*duboisii*, *Atractus* ..... 11, 17, 18, 19  
*duida*, *Atlapetes personatus* ..... 121, 122  
*Platyrinchus mystaceus* ..... 117, 118  
*Troglodytes rufulus* ..... 119  
*Turdus olivater* ..... 119, 120  
**dunni**, *Atractus* ..... 13, 14, 15, 16, 18  
**Durrant**, Stephen D. ....  
*A New Pocket Gopher from South Central Utah* ..... 79-82  
**Durrant**, Stephen D., and M. Raymond Lee .....  
*Three New Pikas (Genus Ochotona) from Utah* ..... 1-10
- Duvall*, Allen J., elected treasurer ..... ix  
*dyscola*, *Pipromorpha oleagina* ..... 57  
**elbaensis**, *Jaculus jaculus* ..... 183, 184  
*Dysithamnus mentalis viridis* ..... 52
- E**
- ecuadorensis**, *Atractus* 13, 15, 16, 17, 18  
*edulis*, *Pinus* ..... 65, 70, 102, 199, 202  
**elbaensis**, *Jaculus jaculus* ..... 183, 184  
**electa**, *Brachoria* ..... 25, 27, 28  
*elegantulus*, *Spathiulus* ..... 88  
*elgonis*, *Zorilla zorilla* ..... 190  
*elongata*, *Rohdnicola* ..... 133, 134  
*elongatus*, *Pseudopsyllus* ..... 137  
*emigrans*, *Xiphocolaptes promeropirhynchus* ..... 115  
*engelmanni*, *Cinara* ..... 74  
*engelmannii*, *Pinus* ..... 76  
*enigma*, *Cinara* ..... 77  
*Epeloria bimaculata* ..... 24  
*fictus* ..... 24  
*Ergasilus* ..... 136, 138  
*ergus*, *Auxobolus* ..... 88  
*erythrae*, *Zorilla zorilla* ..... 190  
*erythropygus*, *Polydesmus* ..... 23  
*ethotela*, *Brachoria* ..... 25, 27  
*Ethopolys bipunctatus insulatus* ..... 180  
*Eucybe clarus* ..... 87  
*Eulachnus brevipilosus* ..... 63  
**Eumops amazonicus** ..... 177, 178  
*bonariensis* ..... 178  
*hansae* ..... 178  
*Euphonia ruficeps exsul* ..... 57  
*Eurhinocricus* ..... 151  
*barrios* ..... 32  
*biolleyi* ..... 31, 32, 33  
*chichivacus* ..... 33  
*cingendus* ..... 33  
*cockerelli* ..... 33  
*eutypus* ..... 33  
*fissus* ..... 34  
*gossei* ..... 34  
*heteroscopus* ..... 34  
*insulatus* ..... 34, 35  
*mandevillei* ..... 34  
*omiltemae* ..... 31, 34  
*parvior* ..... 34  
*parvissimus* ..... 31, 34  
*pygmoideus* ..... 35  
*sabulosus* ..... 35  
*solitarius* ..... 35  
*storkani* ..... 35  
*tidius* ..... 31  
*townsendi* ..... 35  
*williamsi* ..... 35  
*eurygnatha*, *Thalasseus* ..... 114  
*euryura*, *Rhipidura* ..... 44, 45, 46  
*Euryurus aculeatus louisiana* ..... 22  
*Eutamias sibiricus barberi* ..... 175, 176  
*orientalis* ..... 176  
*senescens* ..... 176  
*Eutheatus aculeatus* ..... 23  
*eutypus*, *Eurhinocricus* ..... 33  
*evides*, *Auturus* ..... 22  
*Paradesmus* ..... 22  
**eximius**, *Perilitus* ..... 143  
*exsul*, *Euphonia ruficeps* ..... 57  
*Tangara xanthogaster* ..... 57

|                                                   |                    |                                                        |               |
|---------------------------------------------------|--------------------|--------------------------------------------------------|---------------|
| F                                                 |                    | Two New Rice Rats (Genus<br>Oryzomys) from Florida     | 83-86         |
| <b>favillus</b> , <i>Jaculus jaculus</i> .....    | 184                | Handley, Charles O., Jr.,<br>elected member of council | ix            |
| <i>Felis concolor hippolestes</i> .....           | 149, 150           | A New Species of Free-<br>tailed Bat (Genus            |               |
| <i>coryi</i> .....                                | 149, 150           | Eumops) from Brazil                                    | 177-178       |
| <b>schorgeri</b> .....                            | 149, 150           | <i>hansae</i> , Eumops .....                           | 178           |
| Fennah, R. G.                                     |                    | <i>Harpaphe pottera</i> .....                          | 90            |
| A New Tropicuchid from                            |                    | Harper, Francis                                        |               |
| Japan (Homoptera:                                 |                    | The Type Locality of                                   |               |
| Fulgoroidea) .....                                | 125-128            | <i>Hyla triseriata</i> Wied .....                      | 155-156       |
| <i>feriarium</i> , <i>Helocaetes</i> .....        | 156                | <i>harterti</i> , <i>Mülleripicus</i>                  |               |
| <i>Pseudacris nigrata</i> .....                   | 156                | <i>pulverulentus</i> .....                             | 146, 147      |
| <i>fictus</i> , <i>Epeloria</i> .....             | 24                 | <i>hauxwelli</i> , <i>Pipromorpha olea-</i>            |               |
| <i>figginsi</i> , <i>Ochotona princeps</i> .....  | 3, 5, 7, 8         | <i>ginea</i> .....                                     | 57            |
| <i>fissus</i> , <i>Eurhinocricus</i> .....        | 34                 | <i>Heliangelus amethysticollis</i>                     |               |
| <i>flava</i> , <i>Polydora</i> .....              | 131                | <i>amethysticollis</i> .....                           | 50            |
| <i>flavicularis</i> , <i>Troglodytes</i>          |                    | <i>clarisse</i> .....                                  | 49            |
| <i>rufulus</i> .....                              | 118, 119           | <i>decolor</i> .....                                   | 50            |
| <i>floridana</i> , <i>Alysium</i> .....           | 59                 | <i>laticlavus</i> .....                                | 50            |
| <i>floridanum</i> , <i>Illicium</i> .....         | 59                 | <b>verdiscutus</b> .....                               | 48, 49        |
| <i>florus</i> , <i>Auturus</i> .....              | 22                 | <i>Violiceps</i> .....                                 | 48, 49        |
| <i>fodiens</i> , <i>Cambarus</i> .....            | 95                 | <i>Helocaetes feriarum</i> .....                       | 156           |
| <i>Fontaria clara</i> .....                       | 25                 | <i>Hemicyclops</i> .....                               | 137           |
| <i>oblonga</i> .....                              | 28                 | Herskovitz, Philip                                     |               |
| <i>Formicarius analis</i>                         |                    | Status of the Generic                                  |               |
| <i>griseoventris</i> .....                        | 53                 | Name <i>Zorilla</i> (Mam-                              |               |
| <i>saturatus</i> .....                            | 53                 | malia): Nomenclature by                                |               |
| <i>virescens</i> .....                            | 53                 | Rule or by Caprice .....                               | 185-192       |
| <i>fornacula</i> , <i>Cinara</i> .....            | 74, 77             | Hersiliodes .....                                      | 137           |
| <i>fremonti</i> , <i>Tamiasciurus</i>             |                    | <b>hertigi</b> , <i>Micromys minutus</i> .....         | 167, 168, 169 |
| <i>hudsonicus</i> .....                           | 9                  | <i>heteroscopus</i> , <i>Eurhinocricus</i>             | 34            |
| Friedmann, Herbert, elected                       |                    | <i>Rhinocricus</i> .....                               | 34            |
| vice president .....                              | ix                 | <i>hippolestes</i> , <i>Felis concolor</i> .....       | 149, 150      |
| <i>fuscata</i> , <i>Sterna</i> .....              | 48                 | <i>hirsuta</i> , <i>Cinara</i> .....                   | 101           |
| <i>fuscipes</i> , <i>Ochotona princeps</i> .....  | 3, 4, 7, 9         | Hobbs, Horton H., Jr.                                  |               |
| <b>fuscivertex</b> , <i>Cranioleuca</i>           |                    | A New Crayfish of the                                  |               |
| <i>subscristata</i> .....                         | 50                 | Genus <i>Cambarus</i> from                             |               |
| G                                                 |                    | Mississippi .....                                      | 95-100        |
| <b>gaigeae</b> , <i>Atractus</i> .....            | 12, 14, 15, 16, 19 | Hoffman, Richard L                                     |               |
| <i>Gastrodelphys</i> .....                        | 133                | Studies on <i>Spiroboloid</i> Mil-                     |               |
| <i>ghansiensis</i> , <i>Zorilla zorilla</i> ..... | 190                | lipeds. II. A Second                                   |               |
| <i>giganteus</i> , <i>Zorilla zorilla</i> .....   | 190                | Paper on the Genus                                     |               |
| <i>gilliardi</i> , <i>Pauxi pauxi</i> .....       | 48                 | <i>Eurhinocricus</i> .....                             | 31-36         |
| <i>glabra</i> , <i>Cinara</i> .....               | 62                 | Studies on <i>Spiroboloid</i> Mil-                     |               |
| <i>Glyphorhynchus spirurus</i>                    |                    | lipeds. III. The Genus                                 |               |
| <i>albigularis</i> .....                          | 116                | <i>Spirobolus</i> Silvestri .....                      | 151-154       |
| <i>amacurensis</i> .....                          | 116                | Hood, J. Douglas                                       |               |
| <i>castelnaudi</i> .....                          | 116                | <b>Trips illicii</b> , A proposed                      |               |
| <b>coronobscurus</b> .....                        | 115, 116           | Emendation .....                                       | 59            |
| <i>cuneatus</i> .....                             | 117                | Hottes, F. C.                                          |               |
| <i>inornatus</i> .....                            | 117                | <i>Cinara</i> Descriptions.                            |               |
| <i>integratus</i> .....                           | 116                | (Aphidae) .....                                        | 67-78         |
| <i>pectoralis</i> .....                           | 116                | Hottes, F. C.                                          |               |
| <i>rufigularis</i> .....                          | 116                | Three New Subspecies and                               |               |
| <i>spirurus</i> .....                             | 116                | Figures of Five Previous-                              |               |
| <i>sublestis</i> .....                            | 116                | ly Unfigured Species of                                |               |
| <i>gossei</i> , <i>Cubobolus</i> .....            | 34                 | <i>Cinara</i> .....                                    | 101-104       |
| <i>Eurhinocricus</i> .....                        | 34                 | Three New Species of                                   |               |
| <i>Rhinocricus</i> .....                          | 34                 | <b>Cinara</b> (Aphidae) .....                          | 197-204       |
| <i>gossypinus</i> , <i>Peromyscus</i> .....       | 38                 | Hottes, F. C. and George D.                            |               |
| <i>grandis</i> , <i>Abies</i> .....               | 203                | Butler, Jr. A New Species                              |               |
| <i>granulatus</i> , <i>Polydesmus</i> .....       | 22                 | of <i>Cinara</i> from Arizona                          |               |
| <i>Scytonotus</i> .....                           | 22                 | (Aphidae) .....                                        | 65-66         |
| <i>griseoventris</i> , <i>Formicarius</i>         |                    | Hottes, F. C. and E. O. Essig                          |               |
| <i>analis</i> .....                               | 53                 | A New Species of <i>Cinara</i>                         |               |
| H                                                 |                    | from Oregon (Aphidae)                                  | 61-64         |
| Hamilton, W. J., Jr.                              |                    | <i>hottesi</i> , <i>Cinara</i> .....                   | 70, 75        |
| A New Subspecies of                               |                    | <i>hyalinus</i> , <i>Cinara</i> .....                  | 76            |
| <i>Blarina brevicauda</i> from                    |                    | <i>Hybaphe tersa</i> .....                             | 90, 91        |
| Florida .....                                     | 37-40              | <i>Hydromantes</i> .....                               | 87            |
|                                                   |                    | <i>Hyla triseriata</i> .....                           | 155, 156      |



- I**
- Ictonyx** ..... 185, 189, 190  
     *capensis* ..... 190  
     *striatus* ..... 185  
         *africana* ..... 190  
         *capensis* ..... 190  
         *mustelina* ..... 190  
         *pondoensis* ..... 190  
         *striatus* ..... 190  
*ignotus*, *Xiphocolaptes*  
     *promeropirhynchus* ..... 115  
**Illici, Thrips** ..... 59  
*Illicium floridanum* ..... 59  
*imatatae*, *Platyrinchus*  
     *mystaceus* ..... 118  
*immaculata*, *Myrmeciza im-*  
     *maculata* ..... 52, 53  
*inaccessibilis*, *Zonotrichia*  
     *capensis* ..... 122, 123  
*inornatus*, *Glyphorhynchus*  
     *spirurus* ..... 117  
*insularis*, *Platyrinchus*  
     *mystaceus* ..... 117  
*insulatus*, *Ethopolys*  
     *bipunctatus* ..... 180  
     *Eurhinocricus* ..... 34, 35  
     *Rhinocricus* ..... 34  
*insulicola*, *Sigmodon hispidus*  
     ..... 83, 85  
*integratus*, *Glyphorhynchus*  
     *spirurus* ..... 116  
*intensa*, *Pipromorpha olea-*  
     *ginea* ..... 55, 56, 57  
*intermedius*, *Zorilla zorilla*  
     ..... 190  
**Internotus**, *Anthrepes singa-*  
     *lensis* ..... 147  
*interpositus*, *Anthrepes*  
     *singalensis* ..... 147  
*intestinalis*, *Mytilicola* ..... 136  
*Isocelis maculata* ..... 14, 15
- J**
- Jackson, Hartley H. T.  
     *The Wisconsin Puma* ..... 149, 150  
*Jaculus jaculus butleri* ..... 183  
     *elbaensis* ..... 183, 184  
     *favillus* ..... 184  
     *jaculus* ..... 184  
*japonicus*, *Micromys minutus*  
     ..... 169  
*japonicus*, *Trichoduchus* ..... 125  
*javanensis*, *Centropus toulou*  
     ..... 146  
Johnson, D. H., elected vice  
     president ..... ix  
Johnson, David H., and J.  
     Knox Jones  
         *Three New Rodents of the*  
         *Genera Micromys and*  
         *Apodemus from Korea* ..... 167-174  
         *A New Chipmunk from*  
         *Korea* ..... 175-176  
Jones, J. Knox, and David  
     H. Johnson  
         *A New Reed Vole, Genus*  
         *Microtus, from Central*  
         *Korea* ..... 193-196  
**jugularis**, *Atlapetes*  
     *personatus* ..... 121, 122  
*juniperi*, *Cinara* ..... 102, 103  
*juniperivora*, *Cinara* ..... 102  
*Juniperus communis* ..... 73
- K**
- kalaharicus*, *Zorilla zorilla*  
     ..... 190  
*kempi*, *Rhipidura albicollis*  
     *flabellifera* ..... 42
- kemptoni**, *Turdus olivater 119, 120, 121  
*kentuckiana*, *Tucoria* ..... 28  
*kinabalu*, *Rhipidura albicollis*  
     ..... 44, 46  
**kincaidii**, *Cheilethia* ..... 180  
*Klansolus vicinus* ..... 89  
     *yosemitensis* ..... 89  
Knippling, W. F.  
     Eradication of screw-worm  
         by introduction of gam-  
         maradiated males into  
         the field ..... ix*
- L**
- Lamproglena* ..... 133  
*lancasteri*, *Zorilla zorilla* ..... 190  
*Lantana camara* ..... 143  
*Larus argentatus smith-*  
     *sonianus* ..... 48  
     *atricilla* ..... 48  
         *atricilla* ..... 113  
**lasalensis**, *Ochotona prin-*  
     *ceps* ..... 4, 5, 6, 7, 8, 10  
*lasciocarpa*, *Abies* ..... 69  
*lasciocarpa*, *Cinara* ..... 68, 69, 73  
*lateralis*, *Citellus* ..... 9  
*laticlavus*, *Heliangelus*  
     *amethysticollis* ..... 50  
*Lecanurinus* ..... 136  
*Leucocircia albicollis*  
     *canescens* ..... 41  
*Lichomolgus* ..... 136  
     *major* ..... 136  
*lignator*, *Centropus toulou* ..... 146  
*limpoensis*, *Zorilla zorilla* ..... 190  
*lineatocephalus*, *Xiphoco-*  
     *laptes promeropirhynchus*  
         ..... 115  
*Lophotriccus pileatus*  
     *santaluciae* ..... 55  
     ..... 22  
*louisiana*, *Auturus* ..... 22  
     *Euryurus* ..... 22  
*lubbockii*, *Clausia* 130, 131, 133, 134, 138  
*luciae*, *Spirobolinus* ..... 151, 152  
*lucifugus*, *Myotis* ..... 165  
*lutescens*, *Pipromorpha olea-*  
     *ginea* ..... 57
- M**
- macconnelli*, *Zonotrichia*  
     *capensis* ..... 122, 123  
*macrospilota*, *Malaclemys*  
     *terrapin* ..... 157, 159, 160, 161, 162  
         ..... 163, 164  
*maculata*, *Isocelis* ..... 14, 15  
*maculatum*, *Rhabdosoma* ..... 12, 14, 15  
*maculatus*, *Atractus* ..... 14  
*madagascarensis*, *Martiniola*  
     *magdaleneae*, *Pachyrhamphus*  
         *cinnamomeus* ..... 54, 55  
     *major*, *Lichmolgus* ..... 136  
     *Myocheres* ..... 138  
*Malaclemys terrapin*  
     *centrata* ..... 157, 158, 159, 160, 161,  
         ..... 162, 163, 164  
     *macrospilota* ..... 157, 159, 160, 161,  
         ..... 162, 163, 164  
     *rhizophorarum* ..... 157, 160, 161,  
         ..... 162, 163, 164  
**tequesta** ..... 158, 159, 160, 161,  
     ..... 162, 163, 164  
**malkini**, *Scolopendra* ..... 179  
*mandevillei*, *Eurhinocricus* ..... 34  
     *Rhinocricus* ..... 34  
*mantchuricus*, *Apodemus*  
     *agrarius* ..... 170, 171, 172

|                                                                                                                   |                    |
|-------------------------------------------------------------------------------------------------------------------|--------------------|
| mapurita, Viverra .....                                                                                           | 187                |
| Zorilla .....                                                                                                     | 187                |
| martinensis, Mesnilia .....                                                                                       | 131, 133, 134, 138 |
| Martiniola madagascarensis .....                                                                                  | 111                |
| pulla .....                                                                                                       | 110                |
| maximus, Thalasseus .....                                                                                         |                    |
| maximus .....                                                                                                     | 114                |
| Zorilla zorilla .....                                                                                             | 190                |
| maynana, Pipromorpha olea-<br>ginea .....                                                                         | 57                 |
| mcclurkini, Auturus .....                                                                                         | 23, 27             |
| meridionalis, Dendrocincia<br>homochroa .....                                                                     | 50                 |
| Mesnilia .....                                                                                                    | 130, 132, 137, 138 |
| martinensis .....                                                                                                 | 131, 133, 134, 138 |
| Micromys minutus aokii .....                                                                                      | 169                |
| hertigi .....                                                                                                     | 167, 168, 169      |
| japonicus .....                                                                                                   | 169                |
| pygmaeus .....                                                                                                    | 168, 169           |
| ussuricus .....                                                                                                   | 168, 169           |
| Microtus fortis pelliceus .....                                                                                   | 194, 195           |
| uliginosus .....                                                                                                  | 193, 194, 195      |
| Mimuloria castanea .....                                                                                          | 30                 |
| davidcauseyi .....                                                                                                | 30                 |
| minor, Polydesmus .....                                                                                           | 21                 |
| Pseudopolydesmus .....                                                                                            | 21                 |
| mississippiensis, Singulius .....                                                                                 | 23, 27             |
| mehincana, Rudilora .....                                                                                         | 27, 28             |
| molkenboeri, Centropus .....                                                                                      |                    |
| toulou .....                                                                                                      | 146                |
| monophylla, Pinus .....                                                                                           | 102                |
| moorei, Ochotona princeps .....                                                                                   | 1, 3, 5, 7, 9      |
| Muesebeck, C.F.W.<br>A Remarkable New Species<br>of Perilitus from Mexico<br>(Hymenoptera: Bra-<br>conidae) ..... | 143-144            |
| Mülleripicus pulverulentus .....                                                                                  |                    |
| celadinus .....                                                                                                   | 146, 147           |
| harterti .....                                                                                                    | 146, 147           |
| pulverulentus .....                                                                                               | 146, 147           |
| Mus alexandrinus .....                                                                                            | 189                |
| Mustela zorilla .....                                                                                             | 185, 186, 187, 189 |
| mustelina, Ictonyx striatus .....                                                                                 | 190                |
| Rhabdogale .....                                                                                                  | 190                |
| Myicola .....                                                                                                     | 129, 136, 138      |
| Myocheres .....                                                                                                   | 136                |
| major .....                                                                                                       | 138                |
| Myotis californicus .....                                                                                         | 165, 166           |
| lucifugus .....                                                                                                   | 165                |
| planiceps .....                                                                                                   | 165, 166           |
| subulatus .....                                                                                                   | 165, 166           |
| Myrmeciza immaculata .....                                                                                        |                    |
| berlepschi .....                                                                                                  | 53                 |
| brunnea .....                                                                                                     | 52, 53             |
| immaculata .....                                                                                                  | 52, 53             |
| zeledoni .....                                                                                                    | 53                 |
| mystaceus, Platyrrinchus .....                                                                                    |                    |
| mystaceus .....                                                                                                   | 117                |
| Mytilicola .....                                                                                                  | 136                |
| Mytilicola intestinalis .....                                                                                     | 136                |

## N

|                                                    |            |
|----------------------------------------------------|------------|
| Nannaria davidcauseyi .....                        | 30         |
| natator, Oryzomys palustris .....                  | 83, 84, 85 |
| neblinae, Xiphocolaptes<br>promeropirhynchus ..... | 114, 115   |
| neglectus, Platyrrinchus<br>mystaceus .....        | 118        |
| nigritulus, Spirobolinus .....                     | 151        |
| nimbata, Cinara .....                              | 72         |
| nitidula, Cinara .....                             | 72         |
| nyogana, Tingis .....                              | 106        |

## O

|                                                       |                   |
|-------------------------------------------------------|-------------------|
| oblonga, Fontaria .....                               | 28                |
| obscura, Cinara .....                                 | 77                |
| obscuratus, Zorilla zorilla .....                     | 190               |
| Ochotona princeps .....                               | 1, 8              |
| barnesi .....                                         | 6, 7, 8, 9, 10    |
| cinnamomea .....                                      | 1, 3, 4, 6, 7, 9  |
| clamosa .....                                         | 2, 4, 5, 8        |
| figginsi .....                                        | 3, 5, 7, 8        |
| fuscipes .....                                        | 3, 4, 7, 9        |
| lasalensis .....                                      | 4, 5, 6, 8, 10    |
| moorei .....                                          | 1, 3, 5, 7, 9     |
| saxatilis .....                                       | 1, 3, 8           |
| tutelata .....                                        | 9                 |
| uinta .....                                           | 2, 5, 7, 8        |
| utahensis .....                                       | 3, 5, 6, 8        |
| wasatchensis .....                                    | 2, 3, 4, 8, 9, 10 |
| occidentalis, Atractus .....                          | 13, 15, 16, 17    |
| occipitoalbus, Atractus .....                         | 18                |
| oleaginea, Pipromorpha olea-<br>ginea .....           | 57                |
| olivaceus, Xenops minutus .....                       | 51                |
| olivater, Turdus olivater .....                       | 119, 120          |
| omilteme, Eurhinocricus .....                         | 31, 34            |
| Rhinoericus .....                                     | 34                |
| O'Neill, Hugh T., elected<br>president .....          | ix                |
| orangiae, Zorilla zorilla .....                       | 190               |
| orcesi, Atractus .....                                | 17, 18, 19        |
| orenocensis, Xiphocolaptes<br>promeropirhynchus ..... | 114, 115          |
| orientalis, Eutamias<br>sibiricus .....               | 176               |
| orissae, Rhipidura albicol-<br>lis .....              | 42, 43, 44, 46    |
| Oryzomys .....                                        | 38                |
| palustris coloratus .....                             | 83, 84, 85        |
| natator .....                                         | 83, 84, 85        |
| palustris .....                                       | 83, 86            |
| planirostris .....                                    | 83, 84, 85, 86    |
| sanibeli .....                                        | 84, 85, 86        |
| osgoodi, Thomomys bottae .....                        | 80                |
| ovamboensis, Zorilla zorilla .....                    | 190               |
| Owens, Howard B., elected<br>vice president .....     | ix                |

## P

|                                                      |               |
|------------------------------------------------------|---------------|
| pachygnatha, Scolopendra .....                       | 179           |
| Pachyramphus cinnamomeus<br>badius .....             | 54, 55        |
| cinnamomeus .....                                    | 54            |
| magdalenae .....                                     | 54, 55        |
| vividior .....                                       | 54            |
| Pachydesmus clarus .....                             | 25            |
| pacifica, Pipromorpha olea-<br>ginea .....           | 57            |
| Paeromopus cavicolens .....                          | 88, 94        |
| chamberlini .....                                    | 89            |
| Paimokia .....                                       | 90            |
| pallescent, Apodemus<br>agrarius .....               | 169, 170, 171 |
| pallidior, Apodemus<br>agrarius .....                | 170, 171, 172 |
| pallidiventris, Pipromorpha<br>oleaginea .....       | 55, 56, 57    |
| palustris, Oryzomys palustris .....                  | 83, 86        |
| Panaetis .....                                       | 136           |
| panamensis, Xiphocolaptes<br>promeropirhynchus ..... | 115           |
| Paradesmus evides .....                              | 22            |
| Paraphiloconcha .....                                | 136           |
| paraquensis, Atlapetes<br>personatus .....           | 122           |
| Turdus olivater .....                                | 119, 120      |

- parca, *Pipromorpha olea-*  
     *ginea* ..... 55, 56, 57  
 parui, *Atlapetes personatus* ..... 121, 122  
 parvavillosa, *Cinara* ..... 101  
 parvior, *Eurhinocricus* ..... 34  
     *Rhinocricus* ..... 34  
 parvissimus, *Eurhinocricus* ..... 31, 34  
 patens, *Spartina* ..... 83  
 Pauxi paui gilliardi ..... 48  
     pauxi ..... 48  
     unicornis ..... 48  
 pectoralis, *Glyphorhynchus*  
     *spirurus* ..... 116  
 pelliceus, *Microtus fortis* ..... 194, 195  
 peninsulae, *Blarina brevi-*  
     *cauda* ..... 37, 39  
 Pentacora sonneveldi ..... 109, 110  
     *sororia* ..... 109  
     *sphacelata* ..... 109, 110  
 perijanus, *Piprites chloris* ..... 55  
     *Xenops rutilans* ..... 51  
 Perilitus coccinellae ..... 143  
     *eximius* ..... 143  
 Peromyscus gossypinus ..... 38  
 personatus, *Atlapetes*  
     *personatus* ..... 121, 122  
 phaeopygas, *Xiphocolaptes*  
     *promeropirhynchus* ..... 115  
 Phelps, W. H. and W. H.  
     Phelps, Jr., Five New  
         Venezuelan Birds and  
         Nine Extensions of  
         Ranges to Colombia ..... 47-58  
     Seven New Birds from  
         Cerro de la Neblina, Ter-  
         ritorio Amazonas,  
         Venezuela ..... 113-124  
 Pherma ..... 130, 135  
 Philoconcha ..... 136  
 phoenicura *Rhipidura* ..... 44  
 phoenix, *Cheiletha* ..... 179  
 Phyllontocheila alberti  
     *carinata* ..... 105  
     *tricarinata* ..... 105  
     *dilatata* ..... 105, 106  
 Picea engelmannii ..... 76  
 piceicola, *Cinara* ..... 76  
 pilicornis, *Cinara* ..... 74, 76  
 pilosus, *Trichoduchus* ..... 126  
 pinata, *Cinara* ..... 199, 200  
 pinetorum, *Polydesmus* ..... 21  
     *Pseudopolydesmus* ..... 21  
 pinicola, *Apheloria* ..... 25  
 pinona, *Cinara* ..... 104, 202  
 Pinus edulis ..... 65, 70, 102, 199, 202  
     *flexilis* ..... 101  
     *monophylla* ..... 102  
 Piprites chloris antioquiae ..... 55  
     *perijanus* ..... 55  
 Pipromorpha oleaginea  
     *abdominalis* ..... 55, 56, 57  
     *assimilis* ..... 57  
     *chloronota* ..... 55, 56, 57  
     *dorsalis* ..... 55, 57  
     *dyscola* ..... 57  
     *hauxwelli* ..... 57  
     *intensa* ..... 55, 56, 57  
     *lutescens* ..... 57  
     *maynana* ..... 57  
     *oleaginea* ..... 57  
     *pacifica* ..... 57  
     *pallidiventris* ..... 55, 56, 57  
     *parca* ..... 55, 56, 57  
     *Wallacei* ..... 57  
 plancus, *Cheiropus* ..... 24  
 planiceps, *Myotis* ..... 165, 166  
 planirostris, *Oryzomys*  
     *palustris* ..... 83, 84, 85, 86  
     *Thomomys bottae* ..... 81  
 Platyrrhynchus albicollis ..... 42  
     *mystaceus albugularis* ..... 117  
     *bifasciatus* ..... 117  
     *cancrominus* ..... 118  
     *dilutus* ..... 118  
     *duidae* ..... 117, 118  
     *imatatae* ..... 118  
     *insularis* ..... 117  
     *mystaceus* ..... 117  
     *neglectus* ..... 118  
     *ptaritepui* ..... 117, 118  
     *ventralis* ..... 117, 118  
     *zamora* ..... 117  
 Polydesmus bimaculatus ..... 24  
     *castaneus* ..... 30  
     *erythrogyginus* ..... 23  
     *granulatus* ..... 22  
 Polydesmus minor ..... 21  
     *pinetorum* ..... 21  
     *serratus* ..... 21  
 Polydora flava ..... 131  
 pondoensis, *Ictonyx striatus* ..... 190  
 pontis, *Californibolus* ..... 88  
 portulacastrum, *Sesuvium* ..... 85  
 pottera, *Harpaphe* ..... 90  
 powelli, *Thomomys bottae* ..... 79, 80  
 pretoriae, *Zorilla zorilla* ..... 190  
 princeps, *Ochotona* ..... 1, 8  
 Procamburus acutissimus ..... 98  
     *procerus*, *Xiphocolaptes*  
         *promeropirhynchus* ..... 115  
     *producta*, *Brachycybe* ..... 87  
 profuga, *Cibularia* ..... 27, 29  
     *promeropirhynchus*, *Xiphoco-*  
         *laptes promeropirhynchus* ..... 115  
 Pseudacris nigrita feriarum ..... 156  
     *triseriata* ..... 155  
 Pseudomycicola ..... 129  
 Pseudopolydesmus ..... 21  
     *minor* ..... 21  
     *pinetorum* ..... 21  
     *serratus* ..... 21  
 Pseudosyllus elongatus ..... 137  
 ptaritepui, *Platyrrhynchus*  
     *mystaceus* ..... 117, 118  
 puerca, *Cinara* ..... 68, 69  
 pulla, *Martiniola* ..... 110  
     *pulverulentus*, *Mülleripicus*  
         *pulverulentus* ..... 146, 147  
 pygmaeus, *Micromys*  
     *minutus* ..... 168, 169  
 pygmoides, *Eurhinocricus* ..... 35  
     *Rhinocricus* ..... 35  
 R  
 Rattus rattus alexandrinus ..... 189  
 reducta, *Amplocheir* ..... 90, 92, 94  
 Rhabdogale ..... 189  
     *mustelina* ..... 190  
 Rhabdosoma maculatum ..... 12, 14, 15  
 Rhinocricus ..... 31, 32  
     *biolleyi* ..... 33  
     *cingendus* ..... 33  
     *cockerelli* ..... 33  
     *ococs* ..... 33  
     *gossei* ..... 34  
     *heteroscopus* ..... 34  
     *insulatus* ..... 34  
     *mandevillei* ..... 34  
     *omilteme* ..... 34

|                                                                                |                              |                                               |                    |
|--------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|--------------------|
| parvior .....                                                                  | 34                           | Scolopendra <b>malkini</b> .....              | 179                |
| pygmoides .....                                                                | 35                           | pachygnatha .....                             | 179                |
| sabulosus .....                                                                | 35                           | Scytonotus granulosus .....                   | 22                 |
| solitarius .....                                                               | 35                           | senegalensis, Zorilla zorilla .....           | 190                |
| townsendi .....                                                                | 35                           | senescens, Eutamias sibiricus .....           | 176                |
| wheeleri .....                                                                 | 33                           | sequoia, Amplocheir .....                     | 92                 |
| williamsi .....                                                                | 35                           | sequoia, Caseya .....                         | 90                 |
| Rhipidura albicollis .....                                                     | 41                           | sequoium, Bdelozonium .....                   | 87                 |
| albicollis .....                                                               | 42, 43, 44, 45, 46           | Seridium .....                                | 130, 132           |
| atrata .....                                                                   | 43, 44, 45, 46               | rugosum .....                                 | 134                |
| canescens .....                                                                | 41, 42, 43, 45, 46           | serratus, Polydesmus .....                    | 21                 |
| celsa .....                                                                    | 43, 44, 45, 46               | Pseudopolydesmus .....                        | 21                 |
| cinerascens .....                                                              | 43, 45, 46                   | Sesuvium portulacastrum .....                 | 85                 |
| kempi .....                                                                    | 42                           | <b>setulosa</b> , Cinara .....                | 61, 70             |
| kinabalu .....                                                                 | 44, 46                       | Setzer, Henry W. .....                        |                    |
| orissae .....                                                                  | 42, 43, 44, 46               | Two New Jerboas from .....                    |                    |
| robinsoni .....                                                                | 43                           | Egypt .....                                   | 183-184            |
| sarawacensis .....                                                             | 44, 46                       | <b>setzeri</b> , Streptopelia chinensis ..... | 145                |
| stanleyi .....                                                                 | 42, 43, 44, 45, 46           | shastensis, Abies magnifica .....             | 63, 203            |
| euryura .....                                                                  | 44, 45, 46                   | <b>shermani</b> , Blarina brevicauda .....    | 37, 39             |
| flabellifera kempi .....                                                       | 42                           | shoae, Zorilla zorilla .....                  | 190                |
| phoenicura .....                                                               | 44                           | shortridgei, Zorilla zorilla .....            | 190                |
| rhizophorarum, Malaclemys .....                                                |                              | Sigmocheir calaveras .....                    | 93, 94             |
| terrapin .....                                                                 | 157, 160, 161, 162, 163, 164 | Sigmodon .....                                | 38                 |
| Rhodinicola .....                                                              | 130, 133                     | Sigmodon hispidus insullicola .....           | 83, 85             |
| elongata .....                                                                 | 133, 134                     | <b>Singullurus</b> .....                      | 23                 |
| Rhodinocichla rosea beebiei .....                                              | 58                           | <b>mississippiensis</b> .....                 | 23, 27             |
| Ripley, S. Dillon .....                                                        |                              | Smith, Albert C., elected .....               | ix                 |
| Variation in the white-throated Fantail Flycatcher, Rhipidura albicollis ..... | 41-46                        | smithsonianus, Larus .....                    |                    |
| robinsoni, Rhipidura albicollis .....                                          | 43                           | argentatus .....                              | 48                 |
| roraimae, Turdus olivater .....                                                | 119, 120                     | solitarius, Eurhinocricus .....               | 35                 |
| Zonotrichia capensis .....                                                     | 122, 123                     | Rhinocricus .....                             | 35                 |
| <b>Rudifloria mohicana</b> .....                                               | 27, 28                       | <b>sonata</b> , Cinara .....                  | 200, 202           |
| ruficeps, Dendrocincla homochroa .....                                         | 50                           | sonneveldi, Pentacora .....                   | 109, 110           |
| rufigularis, Glyphorhynchus spirurus .....                                     | 116                          | <b>sororia</b> , <b>Pentacora</b> .....       | 109                |
| rufulus, Troglodytes rufulus .....                                             | 119                          | Spartina patens .....                         | 83                 |
| rugosum, Seridium .....                                                        | 134                          | Spathiulus elegantulus .....                  | 88                 |
| Russell, Louise H., elected member of council .....                            | ix                           | Spathoria bimaculata .....                    | 24                 |
| S                                                                              |                              | sphacelata, Pentacora .....                   | 109, 110           |
| Sabellacheres .....                                                            | 133                          | Spilogle .....                                | 185, 186           |
| sabulosus, Eurhinocricus .....                                                 | 35                           | Spirobolinus .....                            | 151, 152, 154      |
| Rhinocricus .....                                                              | 35                           | luciae .....                                  | 151, 152           |
| sanctae-martae, Turdus olivater .....                                          | 119, 121                     | nigritulus .....                              | 151                |
| Xiphocolaptes .....                                                            |                              | uncigerus .....                               | 87                 |
| promeroperhynchus .....                                                        | 115                          | spirurus, Glyphorhynchus .....                | 116                |
| <b>sanibeli</b> , Oryzomys palustris .....                                     | 84, 85, 86                   | spirurus .....                                | 116                |
| santaluciae, Lophotriccus .....                                                |                              | stanleyi, Rhipidura .....                     |                    |
| pileatus .....                                                                 | 55                           | albicollis .....                              | 42, 43, 44, 45, 46 |
| sarawacensis, Rhipidura .....                                                  |                              | Sterna dougallii dougallii .....              | 113                |
| albicollis .....                                                               | 44, 46                       | Sterna fuscata .....                          | 48                 |
| saturatus, Formicarius .....                                                   |                              | stolidus, Anous .....                         | 48                 |
| analis .....                                                                   | 53                           | Stone, Alan, elected vice president .....     | ix                 |
| Savage, Jay M. .....                                                           |                              | storkani, Eurhinocricus .....                 | 35                 |
| Descriptions of New Colubrid Snakes, Genus .....                               |                              | Streptopelia chinensis .....                  |                    |
| Atractus, from Ecuador .....                                                   | 11-20                        | chinensis .....                               | 145                |
| saxatilis, Ochotona princeps .....                                             | 1, 3, 8                      | <b>setzeri</b> .....                          | 145                |
| Scalopus aquaticus bassi .....                                                 | 37                           | vacillans .....                               | 145                |
| Schantz, Viola S., elected member of council .....                             | ix                           | striatus, Bradypus .....                      | 189, 190           |
| <b>schorgeri</b> , Felis concolor .....                                        | 149, 150                     | Ictonyx striatus .....                        | 185, 190           |
| Schwartz, Albert .....                                                         |                              | subcristata, Cranioleuca .....                |                    |
| The Diamondback Terrapins (Malaclemys terrapin) of Peninsular Florida .....    | 157-164                      | subcristata .....                             | 51                 |
| schwarzii, Cinara .....                                                        | 66                           | sublestis, Glyphorhynchus .....               |                    |
|                                                                                |                              | spirurus .....                                | 116                |
|                                                                                |                              | subulatus, Myotis .....                       | 165, 166           |
|                                                                                |                              | sudanicus, Zorilla zorilla .....              | 190                |
|                                                                                |                              | T                                             |                    |
|                                                                                |                              | Tachyphonus canigularis .....                 | 58, 121            |
|                                                                                |                              | talpoides, Thomomys .....                     | 80                 |
|                                                                                |                              | Tamiasciurus hudsonicus .....                 |                    |
|                                                                                |                              | fremonti .....                                | 9                  |
|                                                                                |                              | ventorum .....                                | 9                  |

- Tangara xanthogaster exsul 57  
 tanneri, Cinara 68  
 tenebrosus, Xiphocolaptes  
   promeropirhynchus 114, 115  
**tequesta**, Malaclemys ter-  
   rapin 158, 159, 160, 161,  
     162, 163, 164  
 Teredicola 131, 132, 133, 135, 137  
 Teredicola typica 132, 134  
 tersa, Hybaphe 90, 91  
 tidius, Eurhinocricus 31  
 Thalasseus eurygnatha 114  
   maximus maximus 114  
 Thomomys bottae absonus 79, 80, 81  
   dissimilis 80, 81  
   osgoodi 80  
   planirostris 81  
   **powelli** 79, 80  
   trumbullensis 80, 81  
   talpoides 80  
 Thrips alysi 59  
   **illici** 59  
 Tingis dilatata 106  
   **nyogana** 106  
 Tocoheres cylindraceus 136  
 toulou, Centropus 145  
 townsendi, Eurhinocricus 35  
   Rhinocricus 35  
 tricarinata, Phyllotochelia  
   alberti 105  
 Trichoduchus biernani 125, 126  
   china 126  
   **japonicus** 125  
   pilosus 126  
 trilineatus, Atractus 11, 16, 18  
 triseriata, Hyla 155, 156  
   Pseudacris nigrita 155  
 Trochicola 136  
 Troglodytes rufulus duidae 119  
   flavicularis 118, 119  
   rufulus 119  
   **wetmorei** 118, 119  
   yavii 118, 119  
 trumbullensis, Thomomys  
   bottae 80, 81  
 Tucoria **calceata** 27, 28  
   kentuckiana 28  
 tularea, Xystocheir 91  
 tuobita, Cibularia 29  
 Turdus olivater cauae 119, 121  
   duidae 119, 120  
   **kemptoni** 119, 120, 121  
   olivater 119, 120  
   Paraquensis 119, 120  
   roraimae 119, 120  
   sanctae-martae 119, 121  
 tutelata, Ochotona princeps 9  
 Tylobolus uncigerus 88  
 typica, Teredicola 132, 134
- U**
- uncigerus, Californibolus 87, 88  
   Spirobolus 87  
   Tylobolus 88  
 uinta, Ochotona princeps 2, 5, 7, 8  
**uliginosus**, Microtis fortis 193, 194, 195  
 unicornis, Pauxi pauxi 48  
 ussuricus, Micromys minutus 168, 169  
 utahensis, Ochotona princeps 3, 5, 6, 8
- V**
- vacillans, Streptopelia  
   chinensis 145
- venezuelae, Zonotrichia  
   capensis 123  
 ventorum, Tamiasciurus  
   hudsonicus 9  
**ventralis**, Platyrinchus  
   mystaceus 117, 118  
 verdiscutus, Heliangelus  
   amethysticollis 48, 49  
 Veronia 105  
 vicinus, Californiulus 89  
   Klansolus 89  
 villosa, Cinara 101  
 violiceps, Heliangelus  
   amethysticollis 48, 49  
 verescens, Formicarius analis 53  
 virgatus, Xiphocolaptes  
   promeropirhynchus 115  
 viridis, Dysithamnus  
   mentalis 52  
 Viverra mapurita 187  
   zorilla 185, 186, 187  
 vividior, Pachyramphus  
   cinnamomeus 54
- W**
- wabhaka, Cinara 103  
 wahuca, Cinara 103  
 wahtolca, Cinara 101, 104  
 wallacei, Pipromorpha  
   oleaginea 57  
**wasatchensis**, Ochotona  
   princeps 2, 3, 4, 8, 9, 10  
**wetmorei**, Troglodytes  
   rufulus 118, 119  
 wheeleri, Rhinocricus 33  
 williamsi, Eurhinocricus 35  
   Rhinocricus 35  
 Wilson, Mildred Stratton,  
   and Paul L. Illg  
   The Family Clausiidae  
     (Copepoda, Cyclopodia) 129-142
- X**
- Xenops minutus olivaceus 51  
   rutilans perianus 51  
 Xiphocolaptes promeropir-  
   rhynchus berlepschi 115  
   costaricensis 115  
   crassirostris 115  
   emigrans 115  
   ignotus 115  
   lineatocephalus 115  
   **neblinae** 114, 115  
   orenocensis 114, 115  
   panamensis 115  
   phaecopygas 115  
   procerus 115  
   promeropirhynchus 115  
   sanctae-martae 115  
   tenebrosus 114, 115  
   virgatus 115  
 Xystocheir **cooki** 90, 91, 94  
   tularea 91
- Y**
- yavii, Troglodytes rufulus 118, 119  
 yosemitensis, Californiulus 89  
   Klansolus 89



## Z

|                                  |                    |
|----------------------------------|--------------------|
| zamorae, <i>Platyrinchus</i>     |                    |
| mystaceus .....                  | 117                |
| zeledoni, <i>Myrmeciza imma-</i> |                    |
| culata .....                     | 53                 |
| Zinaria .....                    | 24, 29             |
| <i>Zonotrichia capensis</i>      |                    |
| costaricensis .....              | 123                |
| inaccessibilis .....             | 122, 123           |
| macconnelli .....                | 122, 123           |
| roraimae .....                   | 122, 123           |
| venezuelae .....                 | 123                |
| zorilla, <i>Mustela</i> .....    | 185, 186, 187, 189 |
| Viverra .....                    | 185, 186, 187      |
| Zorilla .....                    | 185, 186, 189      |
| mapurita .....                   | 187                |
| zorilla albescens .....          | 190                |
| arenarius .....                  | 190                |

|                    |     |
|--------------------|-----|
| elgonis .....      | 190 |
| erythrae .....     | 190 |
| ghansiensis .....  | 190 |
| giganteus .....    | 190 |
| intermedius .....  | 190 |
| kalaharicus .....  | 190 |
| lancasteri .....   | 190 |
| limpoensis .....   | 190 |
| maximus .....      | 190 |
| obscuratus .....   | 190 |
| orangiae .....     | 190 |
| ovamboensis .....  | 190 |
| pretoriae .....    | 190 |
| senegalensis ..... | 190 |
| shoae .....        | 190 |
| shortridgei .....  | 190 |
| sudanicus .....    | 190 |
| zorilla .....      | 190 |





